DELIVERABLE № 6, 2000

Training Program

Module 3: Certifiable Climate Change Transactions

Prepared for:
The United States Agency for International Development
under Contract LAG-I-00-98-00005-00, Task Order 16

Prepared by:
PA Government Services Inc.
1750 Pennsylvania Avenue, NW Suite 1000
Washington, DC 200006-4506
USA
(202) 442-2000

September 2000
Updated September, 2002

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Module Contents

Overview

Background

This module is the third in a series of nine, which comprise the Climate Change Initiative's (CCI) near-term training program in Ukraine. As a complete package, these nine modules are intended to build awareness among a wide group of stakeholders on climate change issues pertinent to Ukraine.

Module Three, *Certifiable Climate Change Transactions*, is designed to provide an understanding of the three "flexibility mechanisms" included in the Kyoto Protocol, and Ukraine's potential role in participating in such transactions. As such, it addresses the underlying economic foundation for such transactions; experience gained in employing such mechanisms for other pollutants; regulatory factors, market structure and design and implementation concerns; and the specific concerns associated with CC transactions (some of which have not been fully resolved).

Material for the module was adapted for Ukraine from existing packages and reports, including materials presented at the International Institute for Education (IIE) USAID-sponsored training course in Washington DC in May/June, 2000; and various materials prepared for a UN/DESA course on economic mechanisms held in December, 1998 in the People's Republic of China.

This module was initially presented in Kiev in July, 2000, and the presentation materials from that session are included with this module. It is anticipated, however, that these materials will quickly become dated, and it is suggested that the current status of the Kyoto Protocol flexibility mechanisms and similar topics be updated before every presentation. Also regarding the scope of the problem discussed it is recommended that the Module be conducted in the form of a Conference rather than of a traditional Training or as a combination of the two.

Participation

The ideal audience for this module includes senior level ministry officials, representatives of major industry groups, and especially senior officials from the power sector, energy industries, and the energy ministry. Participants with an economic background, and those from the financial and banking sector, will also benefit.

Objectives

This module aims to impart an understanding of the flexibility mechanisms developed under the Kyoto Protocol, and to familiarize Ukrainian market participants with the experience gained in other countries employing such economic instruments.

The long-term goal is greater utilization of such mechanisms in Ukraine, and participation in international market-oriented efforts to reduce greenhouse gas emissions.

Module Basics (Streamlined Version)

- ***Duration***: 2 days
- ***Participants:*** 40-45
- ***Venue:*** Kiev
- ***Facilities (recommended):*** The module can be presented in any comfortable training facility. Adequate space for plenary presentations should be made available.
- ***Format:*** Workshop; thirteen sessions; each consisting of a 45- to 60-minute presentation, including a question and answer period and discussions.
- ***Instructors:*** Between 2 and 6 Ukrainian experts and 1 international expert
- ***Audio/Visual Needs:*** Overhead projector, overhead monitor
- ***Contacts:*** Natalia Kulichenko and Natalya Parasuk of CCI, Dan Thompson (USAID), Roger Raufer of University of Pennsylvania; Bill Dougherty of Tellus Institute

Module Basics (Enhanced Version)

Requirements are the same as above for the basic module, with the following exceptions:

- ***Duration***: 1 additional (3rd) day required
- ***Participants***: 10 maximum participants for 3rd day
- ***Audio/Visual Needs***:

Market-Simulation Video Presentation. The Electric Power Research Institute (EPRI) in the U.S. has developed a multi-media market simulation which can be employed to illustrate how major power generating facilities can employ market transactions to meet environmental constraints at lower costs. In addition to the materials identified above, it requires: a) 10 individual computers; and b) a U.S. VHS video cassette player and television set.

The computer hardware requirements are quite modest (1 MB hard disk; 640 KB RAM), and the individual computers do not have to be linked (e.g., through a LAN). To run the enhanced version, it is necessary to obtain EPRI's permission. Please contact Dr. Gordon Hester, Electric Power Research Institute, 3412 Hillview Avenue, Palo Alto, California 94304 USA (Phone: 1-650-855-2000).

Materials

The module provides several types of material for use during both the preparation of the workshop, and the workshop itself. This material is outlined below.

Session Overview: The session overviews are "blueprints" for each of the four sessions. The overview of each session provides a summary of the session, listing basic information, such as the general objective, total time, and type of activities involved.

Reading and Resources: Citations for a number of key reports are included for further reference on the subject of market-oriented climate change transactions.

Participant Materials: This material consists of a series of handouts. Only one copy of each of the handouts is included in the workshop package. Copies of the handouts should be made prior to the workshop. The presenter may wish to ask someone to help distribute handouts to save time. Presenters are encouraged to make certain that enough copies of the handouts have been prepared, and to arrange the handouts so that they can be distributed with ease during the workshop.

Overhead transparencies: OHTs for selected sessions are included at the end of this training package. Each of these OHTs is numbered consecutively and has titles based on their content. The organizer of future offerings of Module Three, *Certifiable Climate Change Transactions,* should bear in mind that OHTs for sessions not included in this package will need to be developed in order to make best use of the recommended agenda.

Evaluation Process

Module Three should be evaluated in order to improve the workshop package for more effective subsequent use. The evaluation can be conducted using a simple questionnaire, developed by the UNITAR CC: Train Program, which can be found at the end of this package. At the close of the second day, the organizer should ask the participants to take five to ten minutes to complete the evaluation form. Participants should be asked to put down their names on the forms.

Agenda

A recommended agenda for Module Three appears on the next page followed by the agenda of Module conducted by Climate Change Initiative in July 2000.

Recommended Agenda

DAY 1

09:00 – 10:00	**REGISTRATION**
10:00 – 10:20	**WELCOME & OPENING REMARKS**
10:20 – 10:30	**INTRODUCTION OF SPEAKERS**
10:30 – 11:30	• **SESSION 1: INTRODUCTION TO MARKET-BASED ENVIRONMENTAL MANAGEMENT**
11:30 – 12:30	• **SESSION 2: FLEXIBILITY MECHANISMS UNDER THE KYOTO PROTOCOL**
12:30 – 13:30	***LUNCH***
13:30 – 15:30	**UKRAINIAN VIEW OF MARKET MECHANISMS** • **SESSION 3: INTERNATIONAL CLIMATE CHANGE NEGOTIATIONS** • **SESSION 4: DESIGN & REGULATION OF EMISSIONS MARKETS**
15:30 – 15:45	***BREAK***
15:45 – 16:30	• **SESSION 5: STRUCTURE & USAGE OF EMISSIONS MARKETS**
16:30 – 17:00	**DAY 1 CLOSING REMARKS**

DAY 2

09:00 – 09:15	**SUMMARY OF DAY 1 & INTRODUCTION OF SPEAKERS:**
09:15 – 10:30	• **SESSION 6: EXPERIENCE OF ECONOMIES-IN-TRANSITION WITH JOINT IMPLEMENTATION**

10:30 – 10:45	***BREAK***
10:45 – 12:00	• **SESSION 7: EXPERIENCE OF COUNTRY/MULTILATERAL INVESTORS WITH JOINT IMPLEMENTATION**
12:00 – 13:00	***LUNCH***
13:00 – 15:00	**IMPLEMENTATION CONCERNS** • **SESSION 8: GHG BASELINE DETERMINATIONS** • **SESSION 9: MONITORING, EVALUATION, REPORTING & VERIFICATION (MERV) CONCERNS** • **SESSION 10: NATIONAL GHG EMISSIONS INVENTORY ISSUES**
15:00 – 15:15	***BREAK***
15:15 – 16:00	• **SESSION 11: GHG EMISSIONS TRADING PILOT PROJECTS**
16:00 – 17:00	**PANEL SESSION: FUTURE DEVELOPMENT OF THE CLIMATE CHANGE TRANSACTION MARKETPLACE**
17:00 – 17:30	• **SESSION 12: SUMMARY AND CONCLUSIONS**

Agenda
Certifiable Climate Change Transactions

Sponsored by:

The Ukraine Society for Sustainable Development

Ministry of Fuel and Energy of Ukraine
US Environmental Protection Agency
US Agency for International Development

Organized by:

Climate Change Initiative Center
10-12 July 2000, Kiev, Ukraine
Central Officers' Club, 30/1, Grushevsky Str., (first floor)

Monday, 10 July 2000

09:00 – 10:00	Registration
10:00 – 10:30	Welcome • **Mary Harris,** Project Manager, *Climate Change Initiative* Opening Remarks • **Yuri Samoilenko,** Head of Verkhovna Rada Ecological Committee
10:30 – 10:40	Introduction of Keynote Speaker **Vadim Diukanov,** *Chairman, Ukraine Society for Sustainable Development*
10:45 – 11:15	Keynote Address: Cooperative Mechanisms under the Kyoto Protocol • **Annie Petsonk,** *International Legal Counsel, Environmental Defense*
11:15 – 11:45	**Q & A**

11:45 – 12: 45	From mandates to markets: An historical transition in Environmental management • **Roger Raufer,** *PhD. , P.E., Adjunct Professor, University of Pennsylvania*
12:45 – 14:00	***Lunch***
14:00 – 16:00	**Ukrainian View of Market Mechanisms** **Moderator: Vadim Diukanov** • **A. Bielov,** *Vice President of UNFCCC COP 5,* **Climate Change International negotiations** • **I.Volchin,** *Sr. Scientist, coal Energy technology center, NASU* **Certified Emission Reduction Credits** • **V. Dyukov,** *Director, Ukrenergoefficiency* **Early Stage Joint Implementation**
16:00 – 16:30	**Q & A**
16:30 – 16:50	Day 1 Closing Remarks ***Roger Raufer / Vadim Diukanov***
17:00 – 18:30	Official reception

Tuesday, 11 July 2000

09:00 – 09:15	**Summary of Day 1** • **Vadim Diukanov,** *USSD* **Introduction of Speakers: Dan Thompson,** *Environmental Advisor, USAID/Kiev*
09:15 – 10:00	Design & regulation of Emissions Markets • ***Jeremy Schreifels,*** *USEPA*
10:00 – 11:30	Structure & usage of Emissions Markets • **D. Butler,** *Environmental Analyst, British Energy* **British Energy Experience with Economic Instruments in UK**

- **Jolanta Galon-Kozakiewicz,** *Ph.D., Expert, National Fund for Environmental Protection of Poland*
  Experience of Poland Joint Implementation Secretariat

11:30 – 12:00

- **Irina Trofimova** *, PhD*, ***Technical Advisor, Ukraine Canada Climate Change Program***
  Greenhouse Gas Emissions Reduction Trading Pilot (GERT)

12:00 – 13:00 Lunch

13:00 – 15:00 'Certifiability' of climate change transactions

- **Bill Dougherty,** *Tellus Institute.*
  Baseline determinations
- **J. van Drunen**, *Embassy of Netherlands*
  Netherland Experience Identifying GHG Investment Projects in Eastern Europe
- **Natalia Ivanenko,** *PhD, Sr. Scientist, Institute of Energy, NASU*
  Monitoring, Evaluation, Reporting & Verification concerns
- **N. Parasyuk,** *PhD, Expert, Climate Change Initiative Center*
  National GHG Emissions Inventory Issues

15:00 – 15:30 break

15:30 – 17:00 Future Development of the Climate Change Transaction Marketplace

Moderator: Roger Raufer, *U. of Pennsylvania*

- **Panel Discussion: All Main Speakers will provide comments on size and requirements of ghg market**

17:00 – 17:15 Summary and Workshop closure

- **Bill Dougherty,** *Tellus institute*

17:15 – 17:30	Brief Orientation to next day's simulation exercises (participation limited to next day's attendees only) • **Roger Raufer,** *U. of Pennsylvania* • **Vadim Diukanov,** *USSD*

Wednesday, 12 July 2000

(Because of software design, the number of participants is limited to 20)

09:00 – 09:15	Introduction to Electric Power Research Institute (EPRI) Emissions Trading Simulation • **Roger Raufer,** *U. of Pennsylvania*
09:15 – 10:30	EPRI software Video presentation
10:30 – 11:00	Break
11:00 – 12:30	EPRI software Video presentation
12:30 – 13:30	Lunch
13:30 – 14:15	Computerized Market simulation I: **Electricity market** All participants
14:15 – 15:45	Computerized Market simulation II:

Electricity & emissions market
All participants

15:45 – 16:15 Summary & Conclusions

- **Roger Raufer,** *U. of Pennsylvania*

Session 1: Introduction to Market-based Environmental Management

General Objectives:

Session 1 introduces market-oriented environmental management. It is intended to give a broad overview of the transition from command/control regulation towards a regulatory system that utilizes economic instruments. In this context, the Kyoto Protocol flexibility mechanisms can be seen as "quantity-based" (as opposed to price-based) instruments.

This session will, of necessity, rely upon the experience and knowledge of the individual who makes the presentation. It would be helpful if that individual addresses the following topics, which were included in the initial training program offered in July 2000:

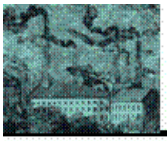
- The historical basis for command/control;
- The engineering approach to pollution control;
- The development of marginal cost and benefit curves;
- Setting environmental goals using economics;
- Utilizing price-based mechanisms to achieve these goals;
- Utilizing quantity-based mechanisms to achieve these goals;
- The historical development of U.S. quantity-based mechanisms and emissions trading:
    - The Emissions Trading Program
    - The Acid Rain Control Program
    - The NOx Budget Control Program
- A brief introduction to the Kyoto Protocol Flexibility Mechanisms as quantity-based mechanisms;
- Summary of market-based environmental management.

  By the end of the session, participants should thus have a basic understanding of:

    - how market-oriented environmental management operates;
    - recent experience in utilizing it; and
    - the role of the Kyoto Protocol flexibility mechanisms as economic instruments.

Activities: Presentation, followed by period of questions and answers

- **Total Time:** 60 minutes

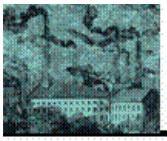


From Mandates to Markets:

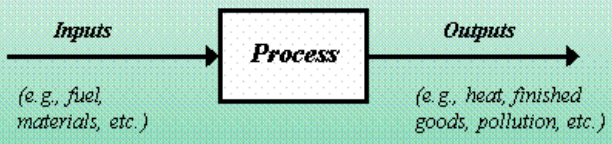
An Historical Transition in Environmental Management

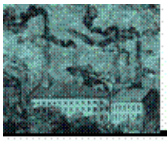
Roger Raufer, Ph.D., P.E.
University of Pennsylvania

Certifiable Climate Change Transactions
Session 1



An Engineer's View

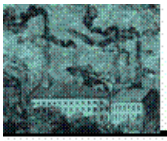




Pollution Control Options

A. Prohibition

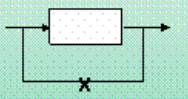
R. Raufer Market-based Environmental Management 3



Pollution Control Options

B. Engineers' Approach

Emission standards
limit the amount of pollution being emitted (e.g., tons/year, pounds per day, etc.)



Performance standards
limit the amount of pollution being emitted based on the amount of material being processed (e.g., pounds of SO_2 per million BTUs of heat input from the fuel source).

Input/Product standards
limit the quality of materials, e.g. fuels, which can be used (e.g. limits on sulfur content of distillate and fuel oils).

Design standards
tell the polluter how the process must be designed (e.g., to minimize wastage of materials).

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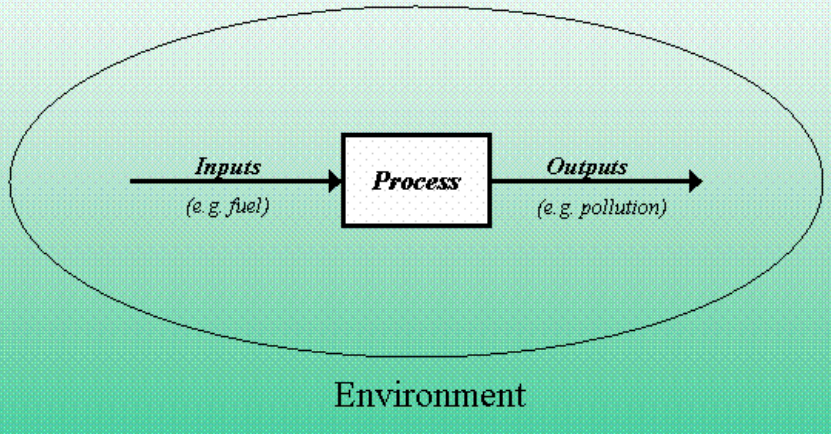
But Where is Environment?



Command/Control Regulation

Goals

physical modeling

Regulatory Means

Environmental Quality Standards

A. Prohibitions

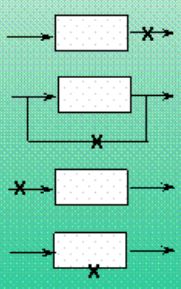
B. Technology-Based Standards

Emission Standards

Performance Standards

Input/Product Standards

Design Standards

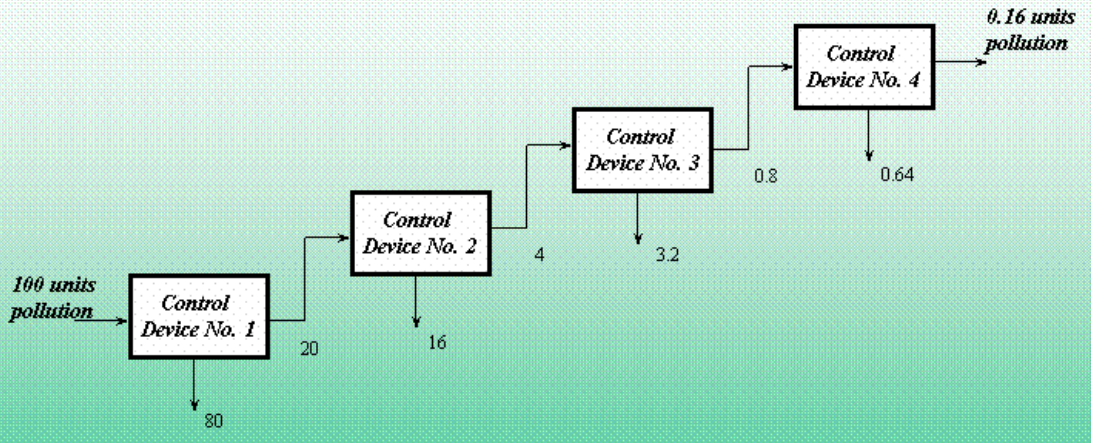


Source: Raufer, 1998

Where is Economics?

R. Raufer Market-based Environmental Management 7

Incremental Pollution Control Improvements



Pollution Units Removed	80	16	3.2	0.64
% Control	80%	96%	99.2%	99.84%

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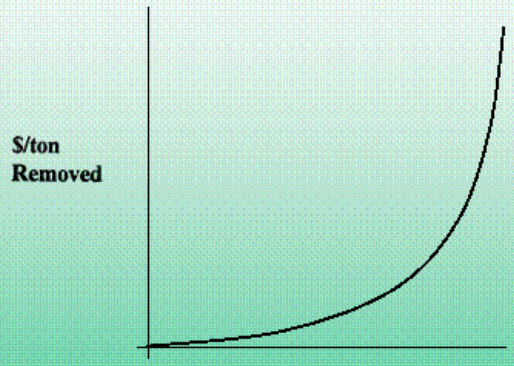
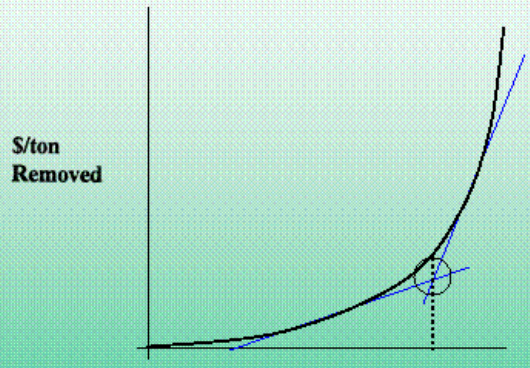
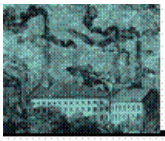
MC Curve



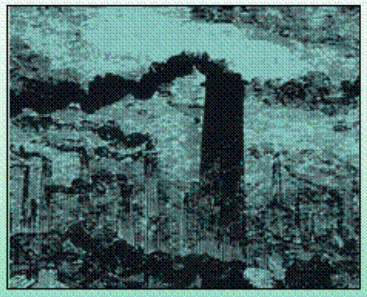
"Kink" in Curve

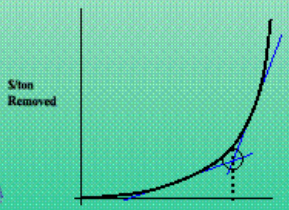




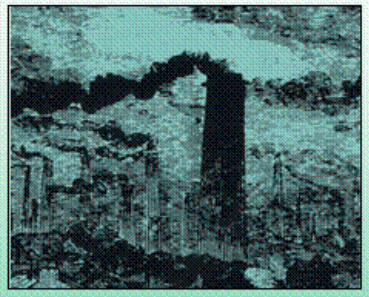
The Economists' Response?

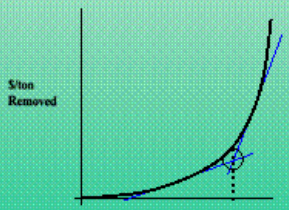
Methyl Isocyanate

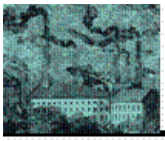




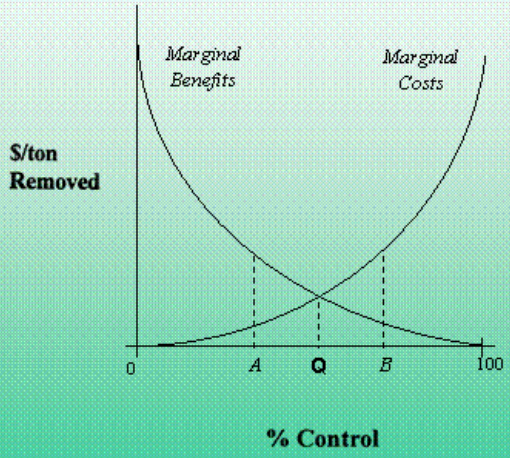
Carbon Dioxide



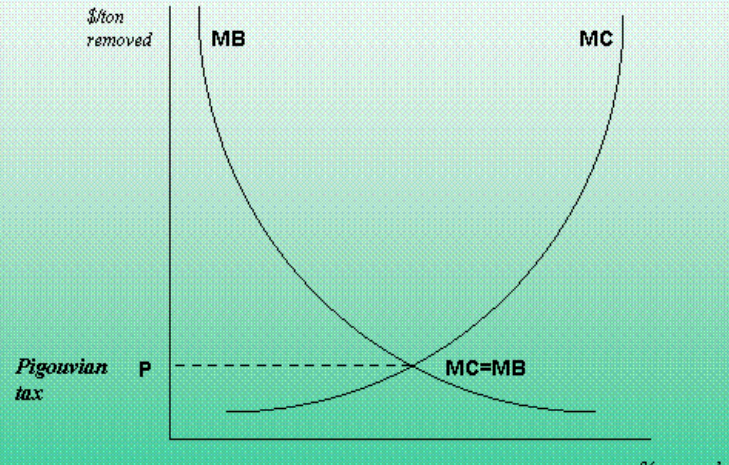




Marginal Costs and Benefits



The Price-Based Approach: Pigouvian Taxation



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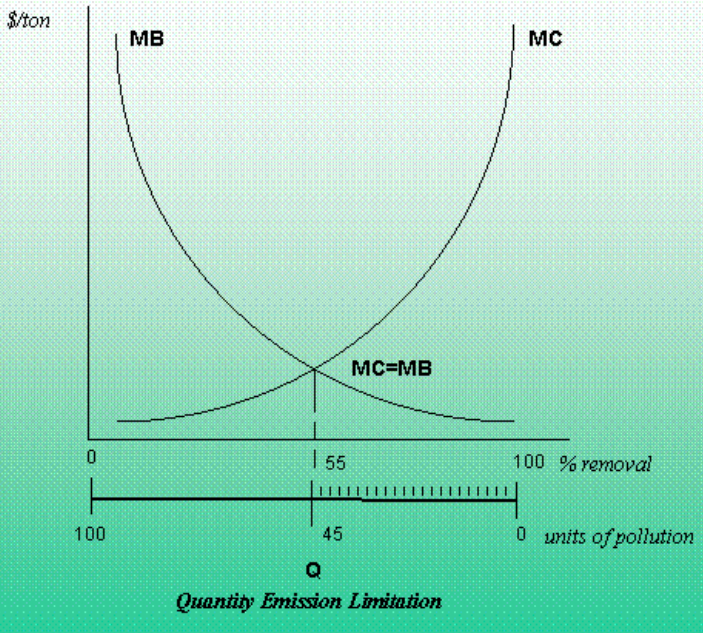
The Quantity-Based Approach: Marketable Permits



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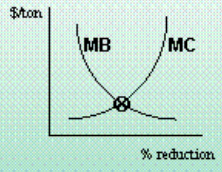
Economic Regulatory Approach

Goals

Marginal Costs (MC) = Marginal Benefits (MB)



Regulatory Means

Pollution Taxes (Price-based)	*Pollution Markets (Quantity-based)*
Pigouvian taxation	*Marketable Permits*

R. Raufer — Market-based Environmental Management — 15

Key Properties of Economic Mechanisms

- Governments focus on environmental goals, rather than stack-by-stack means.
- Economic efficiency gives comparable levels of environmental quality for lower costs.
- Efficiency can influence goal setting (i.e., savings targeted towards environment).
- Every ton of pollution has costs, giving facilities an incentive for reduction.

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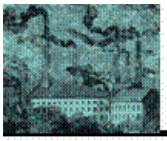
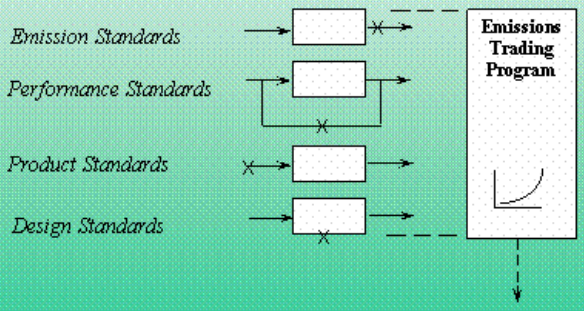


Emissions Trading Program

Goals — *Environmental Quality Standards*

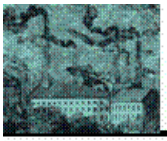
Regulatory Means

1. *Prohibitions*
2. *Technology-Based Standards*



Brokerage Opportunities

Emission Reduction Credits (ERCs)



Acid Rain Control Program

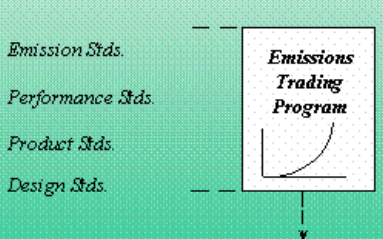
Goals — *Localized SO_2 Levels* — *Total SO_2 Loading*

Regulatory Means

1. *Prohibitions*
2. *Technology-based Standards*

Pollution Markets (Q-based)

Nation-wide Market (Allowance Tracking System)

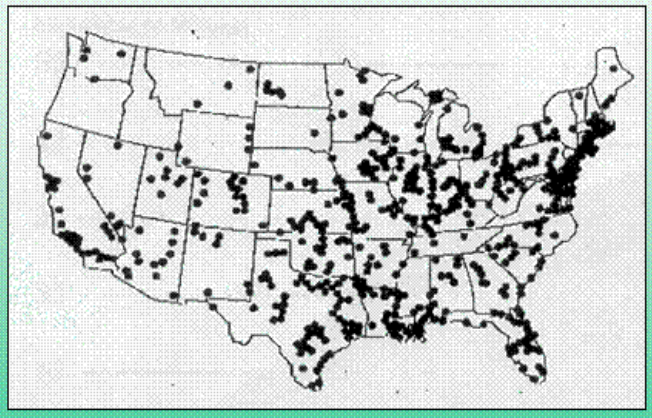


Brokerage Opportunities

ERCs

Emission Allowances

Acid Rain Control Affected Sources



2000+ Electric Utility Units

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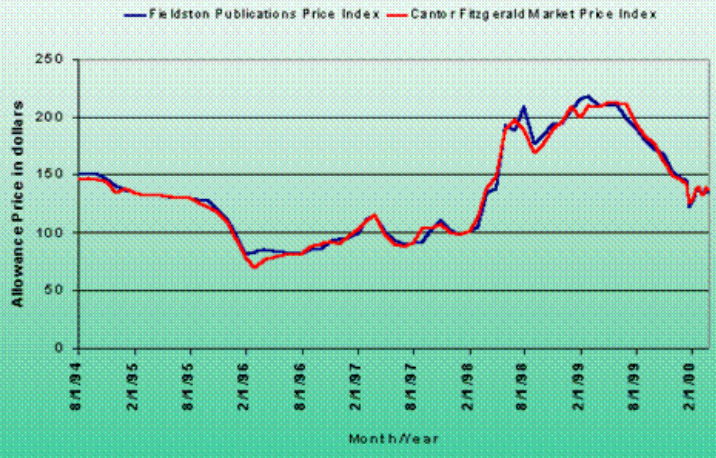
Monthly Average Price of Sulfur Dioxide Allowances



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Ozone Control Program

Goals

Environmental Quality Standards

Regulatory Means

1. Prohibitions
2. Technology-based Standards

Emission Stds.
Performance Stds.
Product Stds.
Design Stds.

Emissions Trading Program

Pollution Markets (Q-based)

City/Regional Markets

Examples:
Northeast U.S. "NOx Budget"
Los Angeles "RECLAIM" Program
Illinois "Clean Air Market"

Brokerage Opportunities

ERCs & Discrete Emissions Reductions (DERs)

NOx/VOC Emission Allowances

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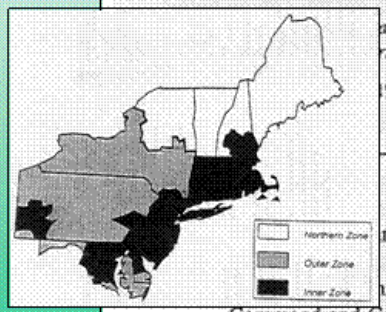
NOx Budget

The NOx Budget: market-based control of tropospheric ozone in the northeastern United States

Alex Farrell [a,*], Robert Carter [b], Roger Raufer [b]

[a] Harvard University, Cambridge, MA, USA
[b] University of Pennsylvania, Philadelphia, PA, USA

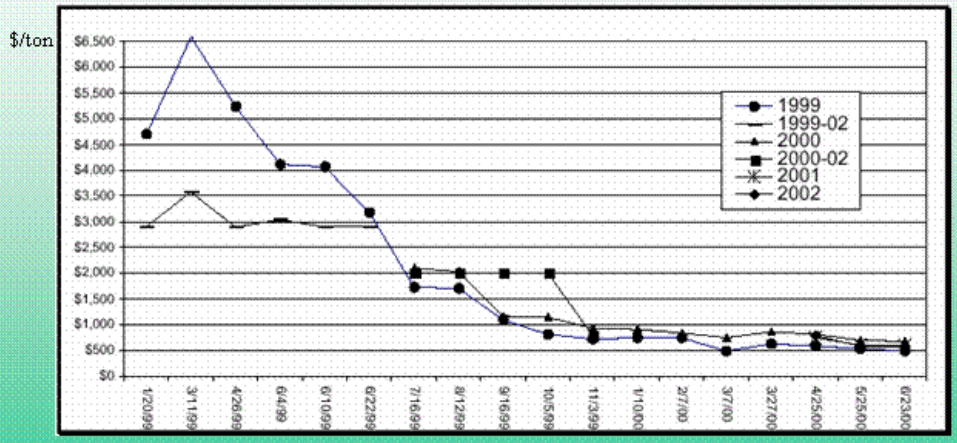
1998; revised 12 August 1998; accepted 21 August 1998



rketable emissions allowance system currently being adopted US to reduce tropospheric ozone concentrations to healthful ner. Oxides of nitrogen (NOx) are currently regulated within mmand and Control (CAC) framework. The introduction of a market-based

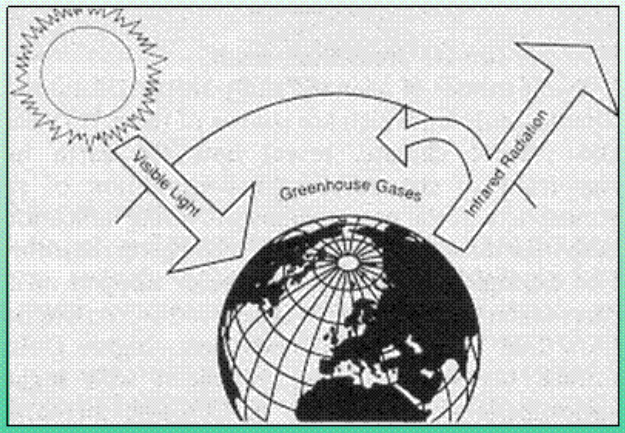
R. Raufer — Market-based Environmental Management — 22

NOx Budget Allowance Prices



Source: Cantor Fitzgerald, June '00

The Greenhouse Effect



Source: GAO, '90

Global Warming P vs. Q Debate

FOREIGN AFFAIRS

Founded 1922

Toward a Real Global Warming Treaty

Richard N. Cooper

THE CHALLENGE AFTER KYOTO

In December 1997 the world's nations met in Kyoto to grapple with the problem of global warming. The Kyoto conference garnered a wide variety of assessments, ranging from "a notable success"

FOREIGN AFFAIRS · *March/April 1998*

Response

Stick with Kyoto

A Sound Start on Global Warming

Stuart Eizenstat

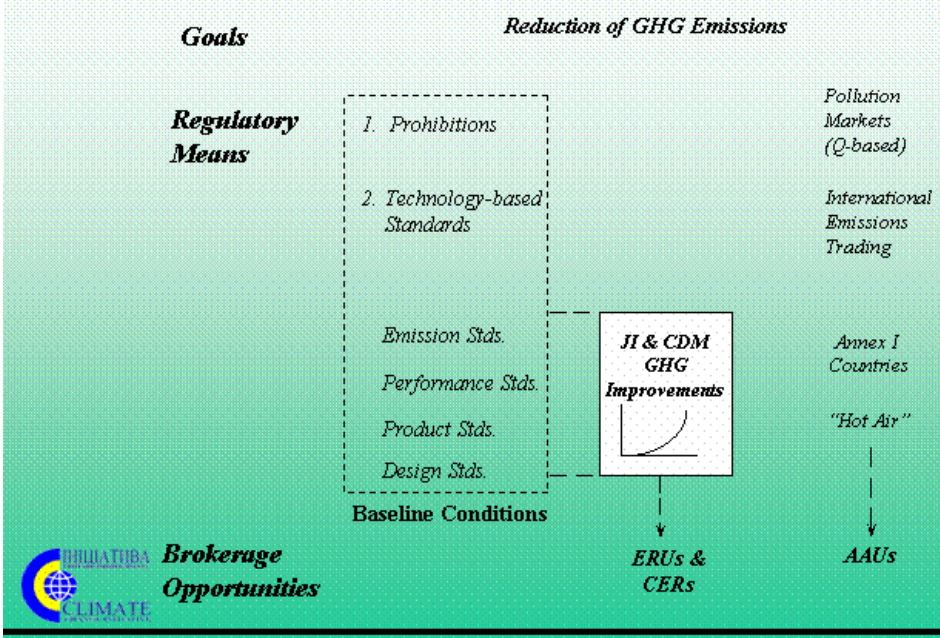
of the recent Kyoto accord, ... taxes. But his belief that ag... a tax might be easier than se... targets is out of touch with ... Even if it could be arranged

FOREIGN AFFAIRS · *May/June*

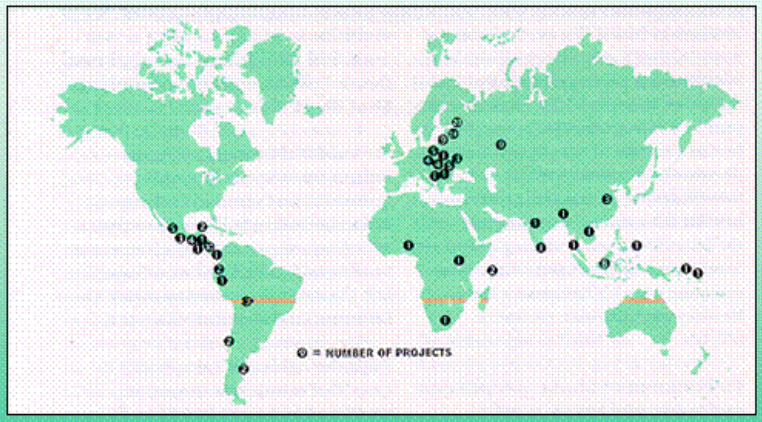
Q-Based Kyoto Flexibility Mechanisms

- Article 6: Joint Implementation
  - Transfer of "emission reduction units"
  - Project-based, effective 2008-2012
- Article 12: Clean Development Mechanism
  - Transfer of "certified emission reductions"
  - Banked after 2000, used during 2008-2012
- Article 17: International emissions trading
  - Transfer of "assigned amount"
  - Annex I countries, 2008-2012

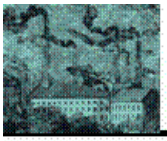
GHG Q-Based Program



Planned and Ongoing AIJ & JI Projects



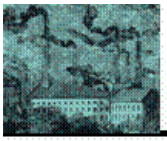
Source: JI Quarterly, Dec. '99



Thirty-Five Years of EM Experience

- **Command/control regulation won the early battles.**
- **Economics became increasingly important as societies climbed the marginal cost curve.**
- **A hybrid regulatory system has developed.**

R. Raufer Market-based Environmental Management 29



Thirty-Five Years of EM Experience

- **Environmental goals set under the command/ control approach, but increasingly employing economic regulatory means.**
- **The U.S. tends to prefer quantity-based economic mechanisms.**
- **European and other countries tend to prefer price-based mechanisms.**

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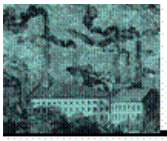
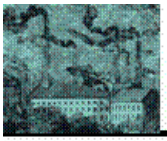


Thirty-Five Years of EM Experience

- **The transition has been gradual, with incremental improvements to increase economic efficiency.**
- **There has been an increased reliance on advanced technological systems (i.e., CEMs) to measure emissions.**
- **The economic mechanisms have relied on the regulatory infrastructure established under the command/control framework.**

R. Raufer Market-based Environmental Management 31



Thirty-Five Years of EM Experience

- **The physical characteristics of the pollutant should influence the selection of the economic instrument.**
- **Broader pollutant markets work better.**
- **The future will increasingly rely on economic mechanisms.**

R. Raufer Market-based Environmental Management 32

Session 2: Flexibility Mechanisms under the Kyoto Protocol

- **General Objectives:**

  Session 2 is an introduction to the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the role of three "flexibility mechanisms" within the Protocol. It seeks to provide participants with an overview of the international response to the challenges of climate change, and particularly the role of each individual flexibility mechanism.

  It should address the following topics:

  - The role of the UNFCCC
  - The role of the Conference of the Parties (COP)
  - Greenhouse gases covered by the convention
  - Reduction commitments of Annex I Parties
  - Joint Implementation
  - The Clean Development Mechanism
  - International Emissions Trading
  - On-going efforts of the COP

  By the end of the session, participants should have a basic understanding of the following:

  - Historical perspective on climate change actions;
  - The role of the UNFCCC and Kyoto Protocol;
  - The role of the Protocol's flexibility mechanisms;
  - Difficulties in implementing the individual flexibility mechanisms.

- **Activities:** Presentation, followed by period of question and answer
- **Total Time:** 60 minutes

Cooperative Mechanisms of the Kyoto Protocol on Climate Change: New Instruments for Environmental Protection and Technology Transfer

Annie Petsonk

International Legal Counsel, Environmental Defense

Certifiable Climate Change Transactions
Session 2

ENVIRONMENTAL DEFENSE
finding the ways that work

Flexible mechanisms 1

The Climate Puzzle

ENVIRONMENTAL DEFENSE
finding the ways that work

Flexible mechanisms 2

Market-Based Policies

- Establish Clear Environmental Goal
- Give Nations And Firms Flexibility to Compete to Achieve Environmental Goals Better, Cheaper, Faster
- Practical Experience Demonstrates:
  - Robust Compliance
  - Technology and Process Innovation
  - Reduced Cost
  - Public Accountability

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Flexible mechanisms 3

Markets as Problem-Solving Tools

- Tap existing on-site expertise in the search for new solutions
- Create incentives for new technologies, processes, and environmental management
- Increase environmental effectiveness
- Reduce compliance costs
- Create financial rewards for total environmental performance

ENVIRONMENTAL DEFENSE finding the ways that work

Flexible mechanisms 4

Building an Effective GHG Emissions Trading System

- *The core elements that are critical to the success of any GHG Emissions Trading System --*
  - **Limit on Total GHG Emissions (Absolute)**
  - **Measurement**
  - **Transparency**
  - **Fungibility**
  - **Consistency**
  - **Integrity**

ENVIRONMENTAL DEFENSE finding the ways that work

Flexible mechanisms 5

Kyoto Protocol on Climate Change

- Adopted by Over 165 Nations
- Signed by all major industrialized nations
- Legally binding caps on GHG emissions for industrialized ("Annex B") nations
- First commitment period: 2008-2012
- Emissions trading among Annex B nations
- Developing nations may participate
- Crediting of carbon sequestration

ENVIRONMENTAL DEFENSE finding the ways that work

Flexible mechanisms 6

Kyoto Protocol on Climate Change

- Four types of emissions trading
- Among nations with caps on emissions:
  - Trading in emissions allowances ("AAUs")
  - Project-based trading ("JI")
  - Redistribution of emissions budgets
- Between "Annex B" nations and others:
  - Project-based trading only (Clean Development Mechanism - CDM)
  - Reductions below what would have otherwise occurred

ENVIRONMENTAL DEFENSE finding the ways that work

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OVERVIEW OF GHG ALLOWANCE SYSTEM

- Five-year Emissions Budgets (2008-2012)
- Emissions Budget Allowances allocated to Annex B Parties
- Emissions Budgets set as percentage of Base Year (1990 or other specified pre-1990 year)
- 1 allowance - 1 ton CO_2-equivalent emissions
- Annual reporting of emissions
- At end of Budget period, each Party must hold allowances equal to emissions (Article 3)

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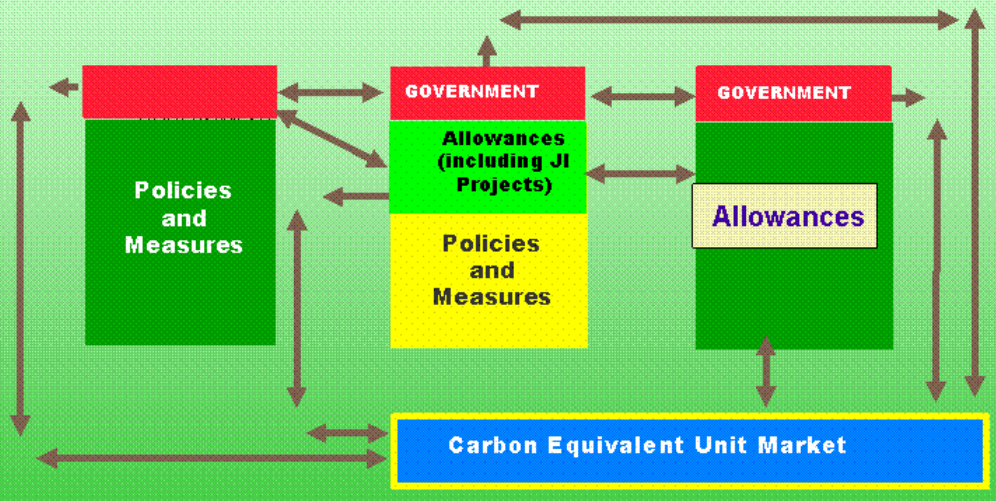
OVERVIEW OF GHG ALLOWANCE SYSTEM, cont'd.

- Governments will determine Marketability of Allowances
  - Internationally - Rules (COP-6)
  - Domestically - National Programs
    - domestic allocation programs
    - allocation to joint implementation projects
    - allocation to enterprises, others who act to reduce emissions early
    - "Green Funds," revolving funds,

ENVIRONMENTAL DEFENSE finding the ways that work

Flexible mechanisms 9

Cooperative Mechanisms of the Kyoto Protocol: Annex B Trading



Source: OECD 1996

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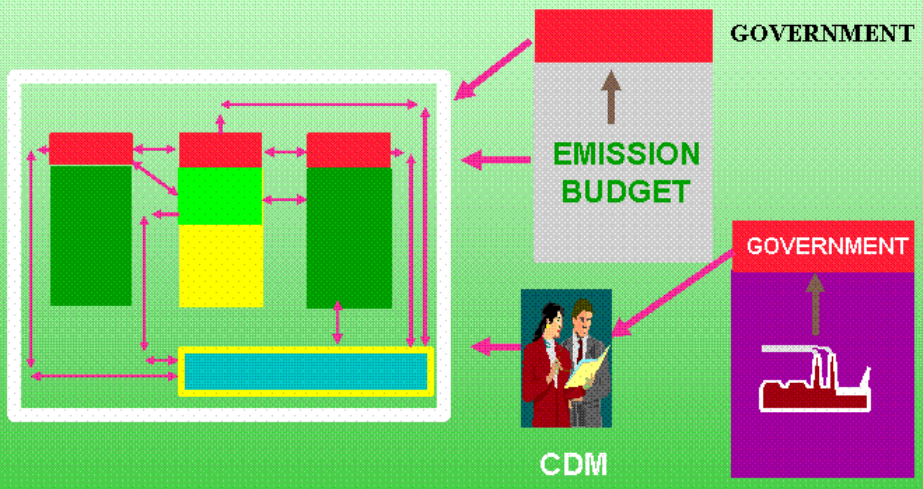
Cooperative Mechanisms, cont'd. Non-Annex B Trading



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Emissions Caps and Budgets

- Compliance = Emissions Allowances = Currency of Trading
- Regulatory Impact on All Other Choices Minimized
  - Regulator does not dictate technology choices to regulated industries
  - All compliance opportunities compete in the compliance marketplace
- Focuses Negotiators on Fundamental Points of Agreement

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Flexible mechanisms 12

Cooperative Mechanisms: Rules Already In Place

- Definition of Tradable Units for Annex B Trading: AAUs, CERs
  - ERUs are simply AAUs allocated to a project that are, after the project, surplus
- Quantification and Reporting Framework for Emissions, Inventories
  - Articles 3.10, 3.11, and 3.12

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Flexible mechanisms 13

Cooperative Mechanisms Compared: SO2 & GHGs

- SO2:
  - U.S. Sulfur Dioxide Emissions Trading Program
  - Controls Acid Rain
- GHGs
  - Kyoto Protocol on Climate Change
  - Limits emissions of global warming gases

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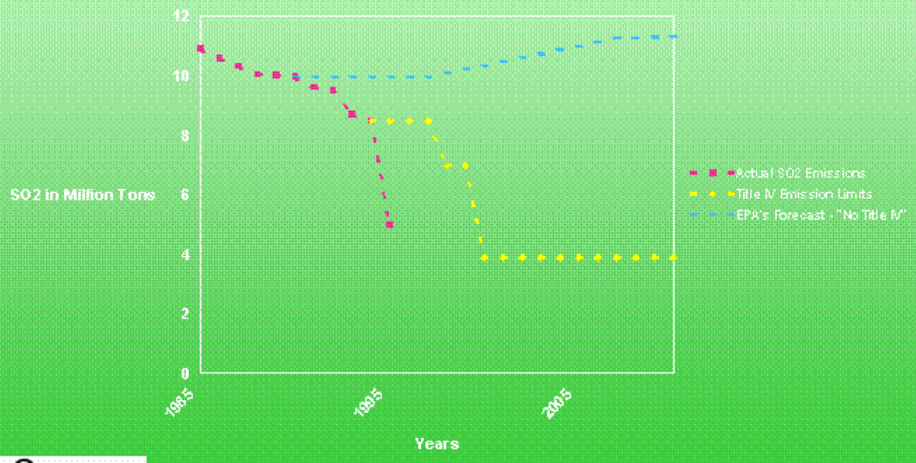
So2 Emissions Caps And Forecasts - Phase I Units



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finding the ways that work

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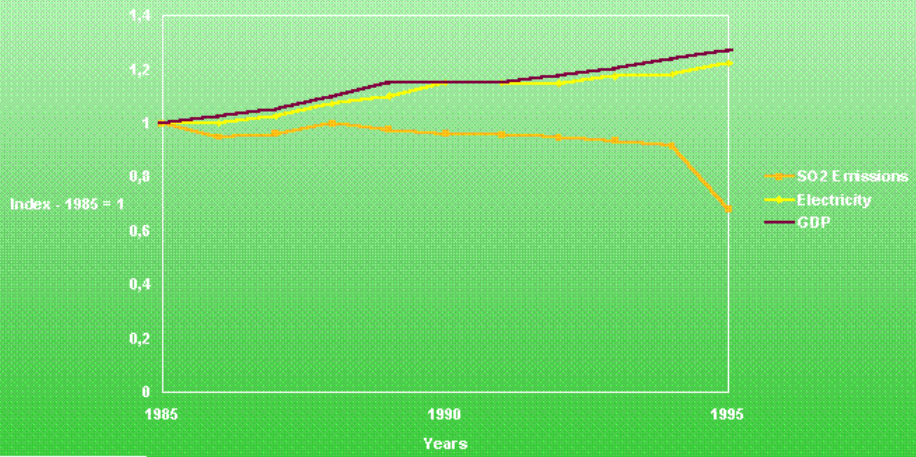
GROWTH INDICATORS AND EMISSIONS



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SO2 & GHGs: Measurement

- SO2:
  - Continuous Emissions Monitors
  - Real-Time Reporting of Transactions
  - Annual Account Balances
- GHGs
  - Annual Emissions Reports Using "Methodologies"
  - Real-Time Reporting of Transactions (?)
  - Annual Account Balances (?)
  - Sinks Accounting?

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SO2 & GHGs: Transparency

- SO2:
  - Emissions Transparency
  - Transactional transparency
- GHGs:
  - Emissions Transparency?
  - Transactional transparency?
  - "Concrete Ceiling" Creates Obstacle to Transparency?

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SO2 & GHGs: Emissions Limits

- SO2:
  - Annual cap on total SO2 emissions
  - Set as multiple of historic base year
  - Two commitment phases
  - Allowances allocated to each boiler
  - Formula in statute
- GHGs:
  - Five-year cap on total GHG emissions
  - Set as multiple of 1990 or earlier year
  - 2008-2012
  - Allowances to each Annex B Party
  - Formula in Annex

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Flexible mechanisms 19

SO2 & GHGs: Fungibility

- SO2
  - Single Pollutant
  - Full Fungibility in Well-Established National System
  - Interpollutant Transactions (NiMo-APS)
  - Transboundary, Cross-Sector Transactions?
- GHGs
  - Six GHGs; GWPs Evolving; Units: AAUs, ERUs, CERs
  - Full Fungibility (across pollutants, sectors, borders, media (sinks) ?
  - Example: NiMo-Suncor

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GHG Fungibility: The NiMo-Suncor Transaction

- NiMo-Suncor (March 1998)
  - NiMo (USA) =>Suncor (CO2 Reductions Below 1990 Levels)
  - Suncor (Canada) => NiMo (Funds to invest in further emissions reductions)
  - Amount:
    - 100,000 metric tons CO2
    - Options on 10 million tons

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SO2 & GHGs: Consistency

- SO2:
  - Rules Established by CAAA'90 and EPA Regs
  - Rule Changes Known In Advance (Phase II)
  - Pending Legislation Could Tighten Caps
- GHGs:
  - Rules Not Yet Established
  - Science Is Evolving
  - Will Sovereigns Resist Temptation of Arbitrary Rule Changes?

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SO2 & GHGs: Integrity

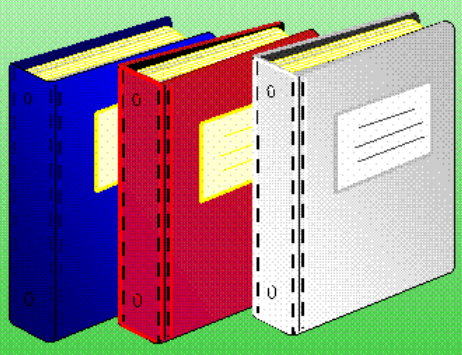
- SO2:
  - Reporting & Monitoring
  - Emissions Overage
  - Sole Sovereign Imposes Stiff Financial Penalty for Both Types of Non-Compliance
- GHGs:
  - Many Sovereigns
  - Financial Penalties Environmentally Problematic
  - Automatic Consequences Needed
  - *Emissions Trading System Provides The Means!*

ENVIRONMENTAL DEFENSE finding the ways that work

Flexible mechanisms 23

The Three Ledgers for Accounting

- Actual Emissions
- Allowances & Transactions
- Reconciliation Between Actual Emissions and Allowances-Net-of Transfers



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Flexible mechanisms 24

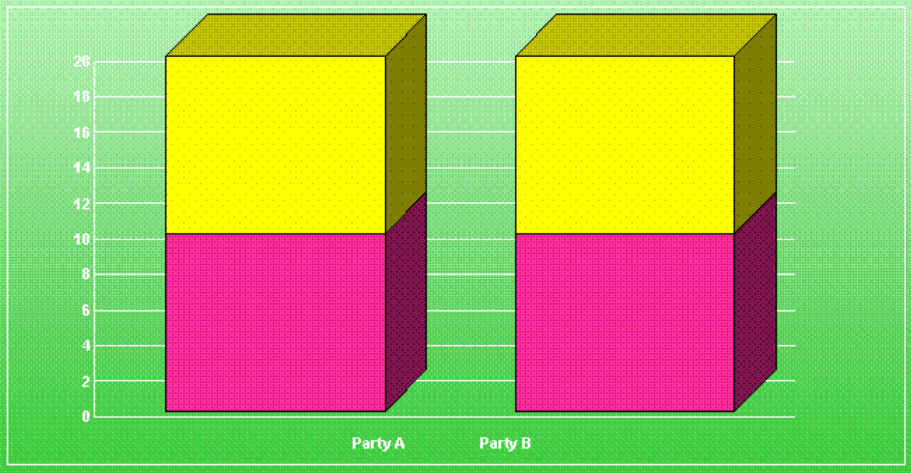
The Ledgerbooks: ET and JI Compared

- The following slides illustrate hypothetical Emissions Trading (ET) and Joint Implementation (JI) transactions.
  - The slides depict only one of the "ledgers" - the transaction ledger.
  - In a real case, the actual emissions ledger and the "reconciliation" ledger also would need to be reported.

Emissions Trading and Joint Implementation (JI): Base Case

- Party A: Allowable Emissions of 20 Tonnes (AAUs)
- Party A's Domestic Allocation:
  - 10 Tonnes for sectors covered by Policies and Measures (PAMs)
  - 10 Tonnes for Power Sector
- Party B: Same as for Party A

Base Case: Party A, Party B. Each Allocates 10 Tonnes of Allowances (AAUs) to PAMs Sector, 10 Tonnes of AAUs to Power Sector



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Flexible mechanisms 27

A Hypothetical Emissions Trade

- Party B Transfers 4 Tonnes of Power Sector Allowances (AAUs) to Party A
- In accordance with KP Articles 3.10, 3.11, Party B subtracts 4 tonnes of AAUs from its total, while Party A adds 4 tonnes to its total.
- In accordance with KP Article 3.1, Party A may emit 24 tonnes, while Party B may only emit 16 tonnes.
- Registers of tonne-accounts must be reconciled with registers of actual emissions (not shown).

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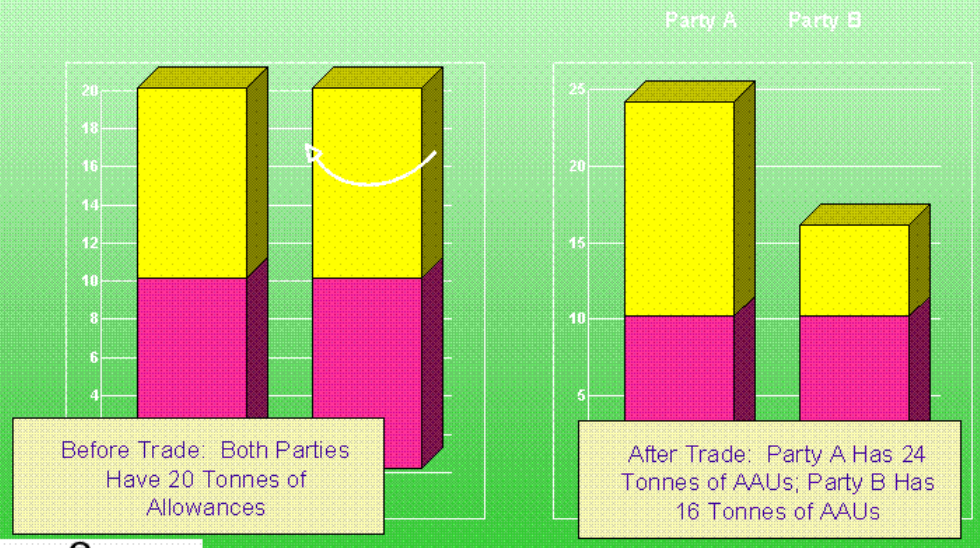
A Hypothetical Emissions Trade: Party B Transfers 4 Tonnes of Power Sector Allowances (AAUs) to Party A (See Articles 3.10, 3.11)



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Flexible mechanisms 29

A Hypothetical JI Project

- Investor in Party A invests in power sector project to reduce Party B emissions from 10 tonnes (baseline) to 6 tonnes.
- The investor seeks to transfer 4 tonnes of ERUs.
- If project actually reduces emissions to 6 tonnes, the 4 tonnes may be transferred.
- Post transfer, power sector will still emit 6 tonnes.
- To ensure compliance, Party B must retain 6 tonnes AAUs to "cover" power sector emissions.
- To ensure that ERUs are truly surplus, Party B must allocate 10 tonnes of AAUs (baseline) to the project *at the outset*.

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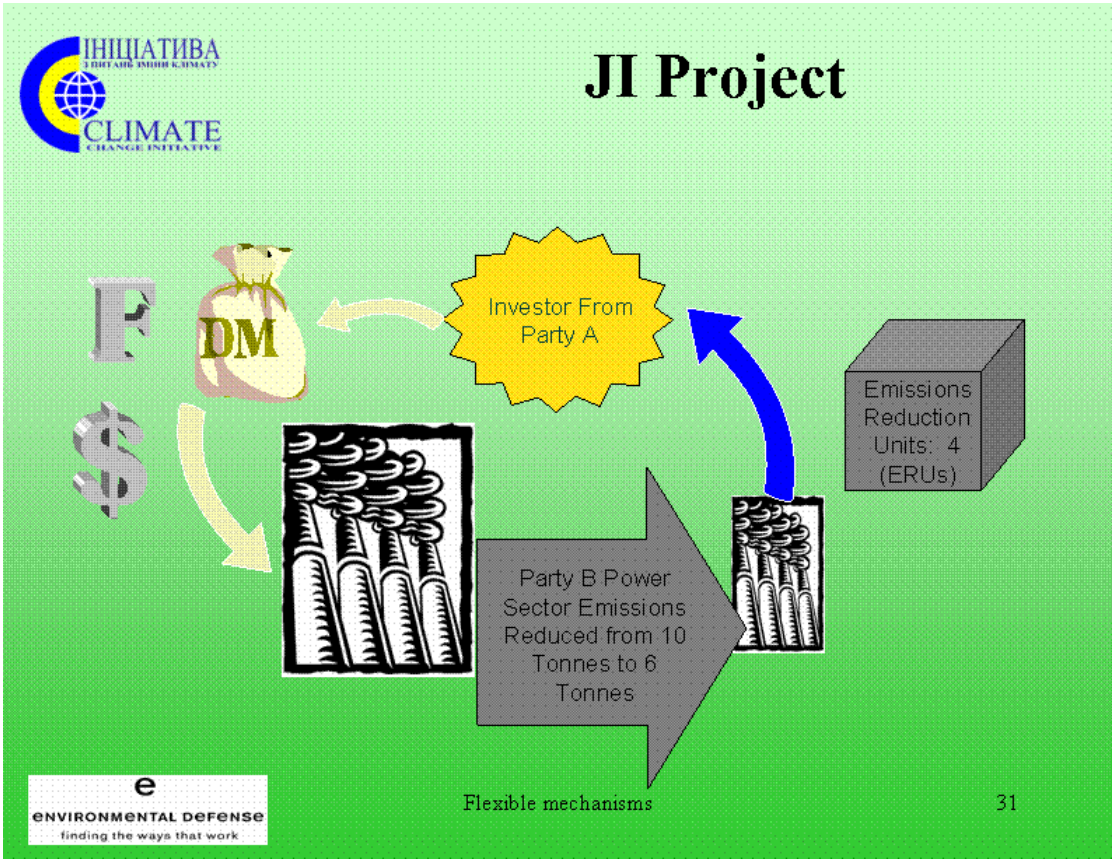
JI Project
F
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Investor From Party A
Emissions Reduction Units: 4 (ERUs)
Party B Power Sector Emissions Reduced from 10 Tonnes to 6 Tonnes
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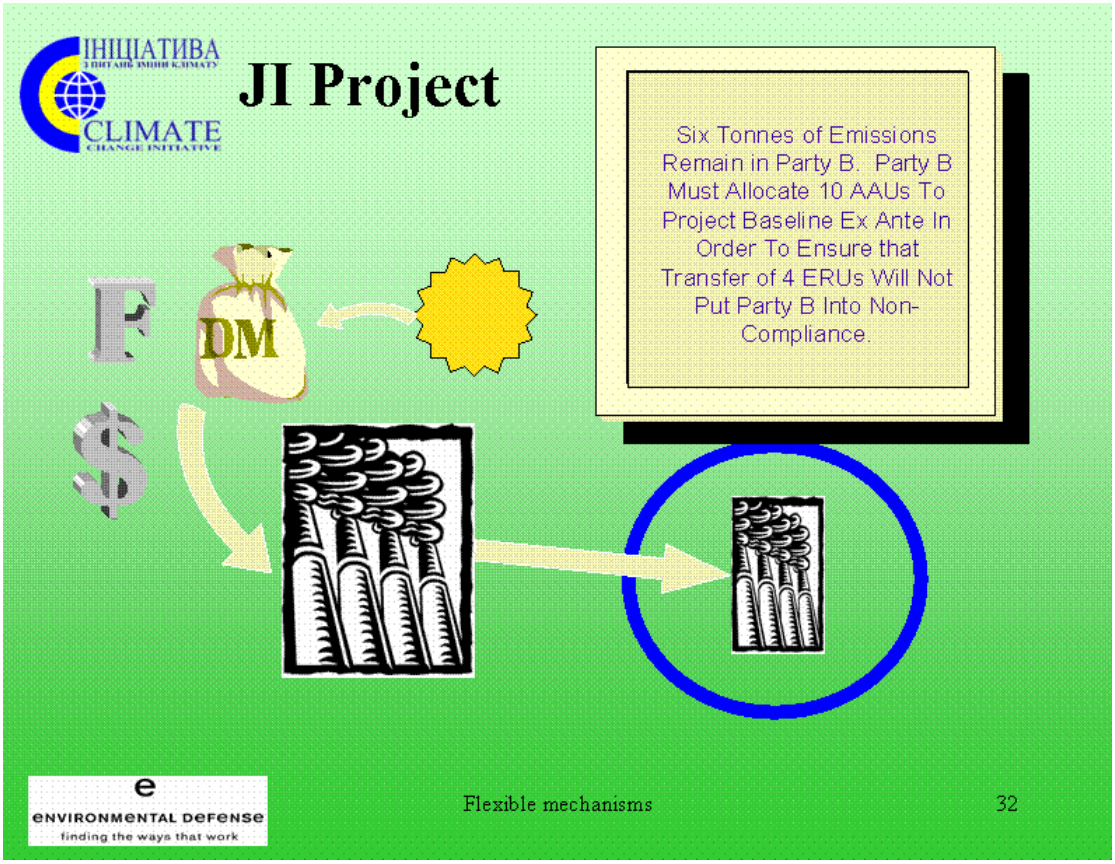
finding the ways that work
Flexible mechanisms
31


JI Project
Six Tonnes of Emissions Remain in Party B. Party B Must Allocate 10 AAUs To Project Baseline Ex Ante In Order To Ensure that Transfer of 4 ERUs Will Not Put Party B Into Non-Compliance.
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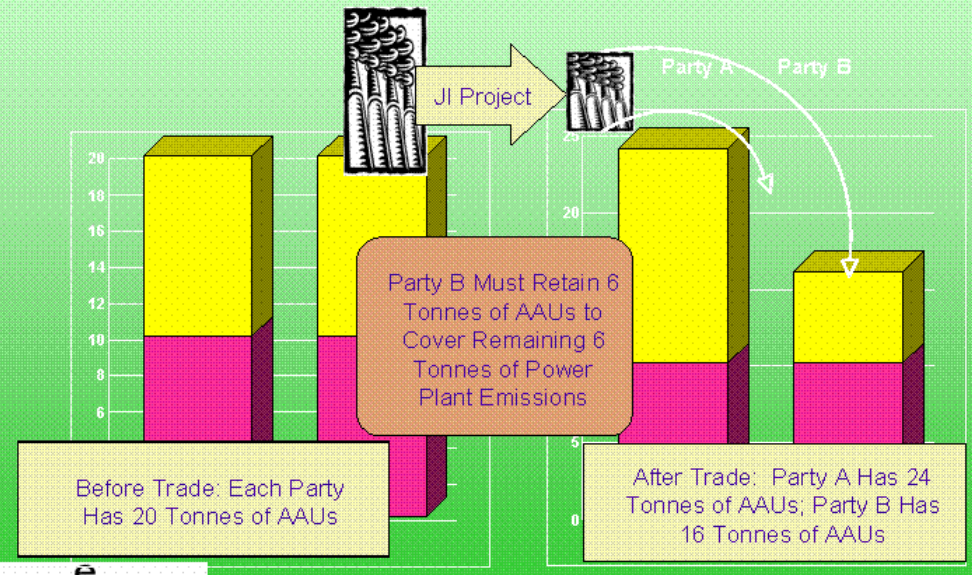
Flexible mechanisms
32

JI Project Accounting: Investments Reduce Party B's Power Sector Emissions From 10 to 6 Tonnes; Party B Transfers 4 Tonnes of Surplus Allowances (ERUs) to Party A; Party B Retains 6 Tonnes of AAUs to Cover Remaining Power Plant Emissions



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Flexible mechanisms 33

JI Project Accounting: Failure To Do Ex Ante Allocation of Baseline

- Suppose a Party fails to make ex ante allocations of JI project baselines.
- Suppose ten projects emit 10 tonnes each as baseline; each project will reduce by 4 tonnes.
- If Party transfers 40 ERUs, but fails to retain 60 AAUs to cover remaining project emissions, Party's actual emissions may exceed AAUs net-of-transfers, and Party will be in non-compliance.

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Flexible mechanisms 34

The Ledgerbooks: Lessons for Compliance

- The Fundamental Challenge of International Legal Instruments For Curbing Climate Change is to *Create Incentives for Sovereign Nations To Comply With Emissions Limitations*
  - Kyoto Protocol Mechanisms Provide Built-In Incentives for Sovereign Compliance
  - Further Mechanisms Needed To Discourage Emissions In Excess Of Assigned Amounts

ENVIRONMENTAL DEFENSE finding the ways that work

Flexible mechanisms 35

Compliance Incentives Needed For All Parties

- Verification and Compliance Incentives Provide AccountabilityFor All Parties:
  - Parties Operating Solely Under Article 3
  - Parties Transferring AAUs Under Art. 17
  - Parties Transferring AAUs Under Art. 6
  - Parties Receiving And Transferring CERS under Art. 12
  - Parties Reallocating AAUs Under Art. 4

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Flexible mechanisms 36

Accounting Rules For Compliance: Key Principles

- The Primary Measure of Kyoto Protocol Compliance:
  - At End of Commitment Period, Are Actual Net Emissions<Adusted Assigned Amount?
  - Basic Accounting Rules: Art.s 3.10-3.12
  - If At End of Commitment Period, A Party's Actual Emissions Exceed Adj. Assigned Amount, *The Party Is In Non-Compliance*
  - Also, If A Party Fails To Report Actual Emissions, *The Party Is In Non-Compliance*

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Accountability Rules For COP-6: Progressively Stringent Consequences

- Compliance Incentives <u>During</u> Budget Period:
  - If AAU Account Balance for remainder of budget period falls below level needed to offset likely remaining emissions, then any future transfers are subject to discount
  - Discount applies automatically if, at end of budget period, the Party's actual emissions exceed its assigned amount.

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Progressively Stringent Consequences, *continued...*

- Compliance Incentives At End of Budget Period:
  - If Net Emissions > Assigned Amount As Adjusted By Transfers, *Party Is In Non-Compliance: Article 18 Is Triggered*
    - *"True-Up"* (e.g., 6 Months) Gives Sovereign Opportunity To Cure Violation
    - If "True-Up" Fails, *Automatic Penalty: Deduction of Excess from Next Budget, with Atmospheric Penalty* (e.g., 1.3:1.0), And Possible Further Article 18 Penalties

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International Institutions

- National Registries
  - Emissions
  - Allowances
- Nomination of Competent Government Authority
- Publication of National Report
  - Emissions and Allowances
- The Accounting Entity
- The Compliance Entity

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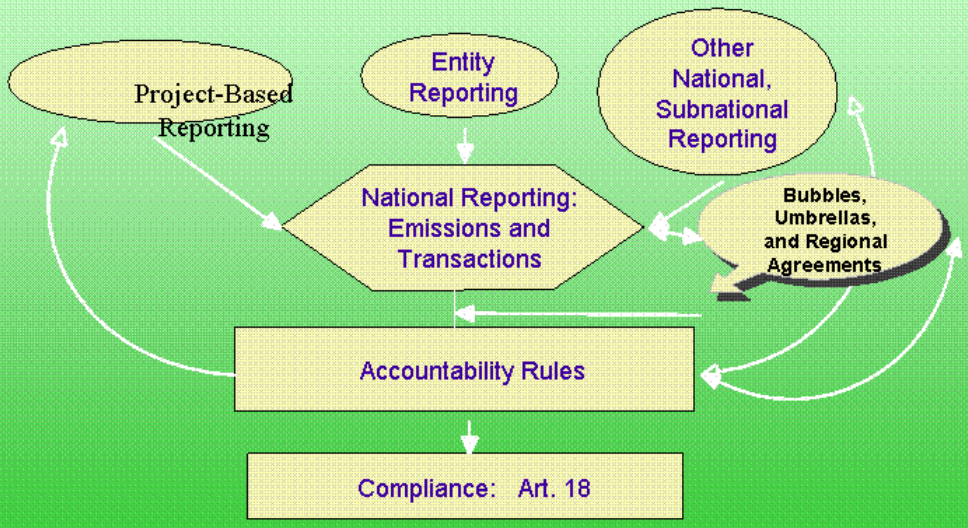
Steps in the Process: Reporting, Accountability and Compliance:



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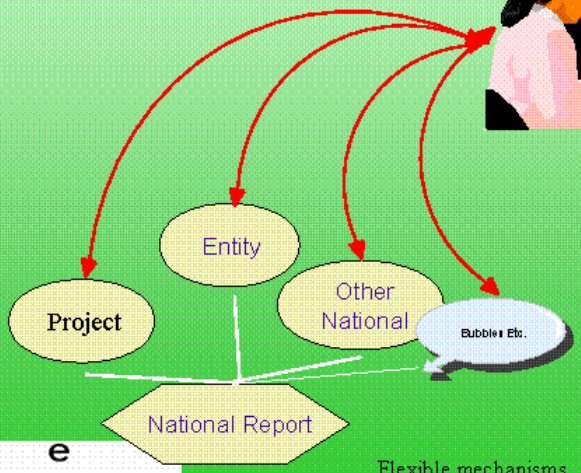
Steps in the Process: Verification



--Standard Reporting Format
--Entity-Level Reporting
-- National Programs
--National Accounting System

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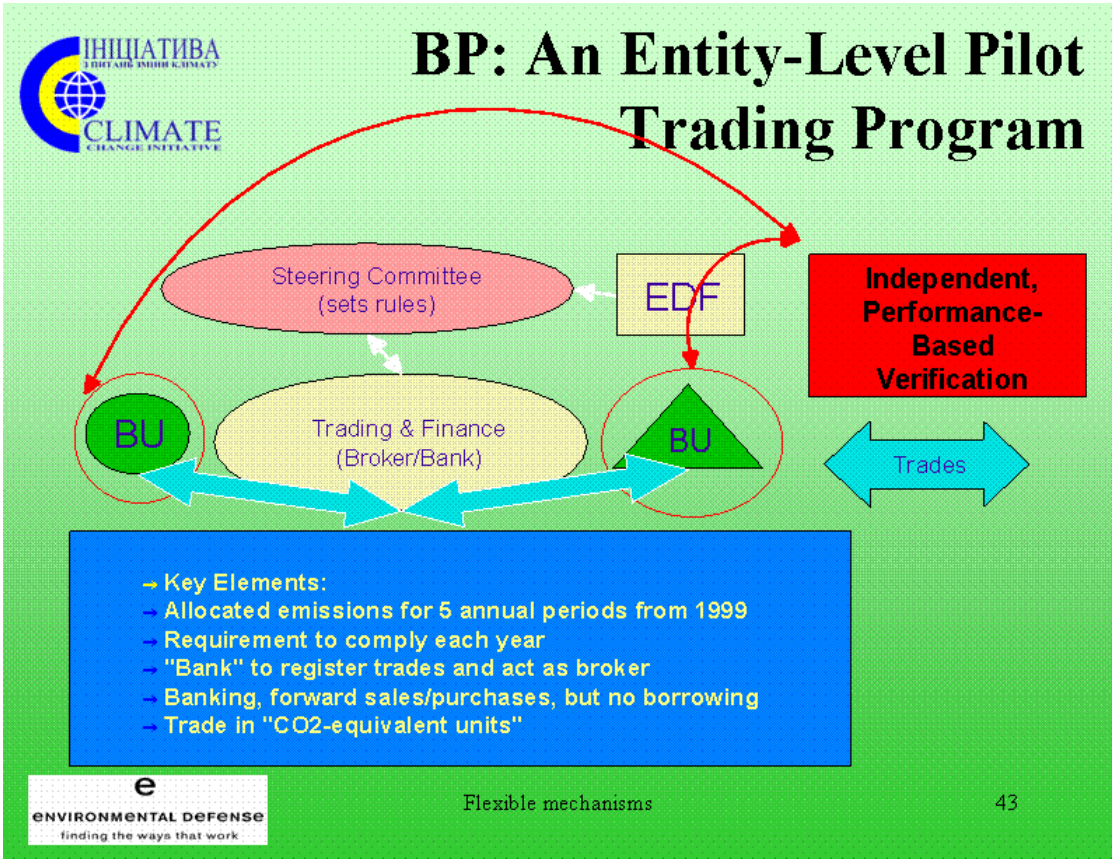
Flexible mechanisms 42


BP: An Entity-Level Pilot Trading Program
Steering Committee (sets rules)
EDF
Independent, Performance-Based Verification
BU
Trading & Finance (Broker/Bank)
BU
Trades
→ Key Elements:
→ Allocated emissions for 5 annual periods from 1999
→ Requirement to comply each year
→ "Bank" to register trades and act as broker
→ Banking, forward sales/purchases, but no borrowing
→ Trade in "CO2-equivalent units"
ENVIRONMENTAL DEFENSE
finding the ways that work
Flexible mechanisms
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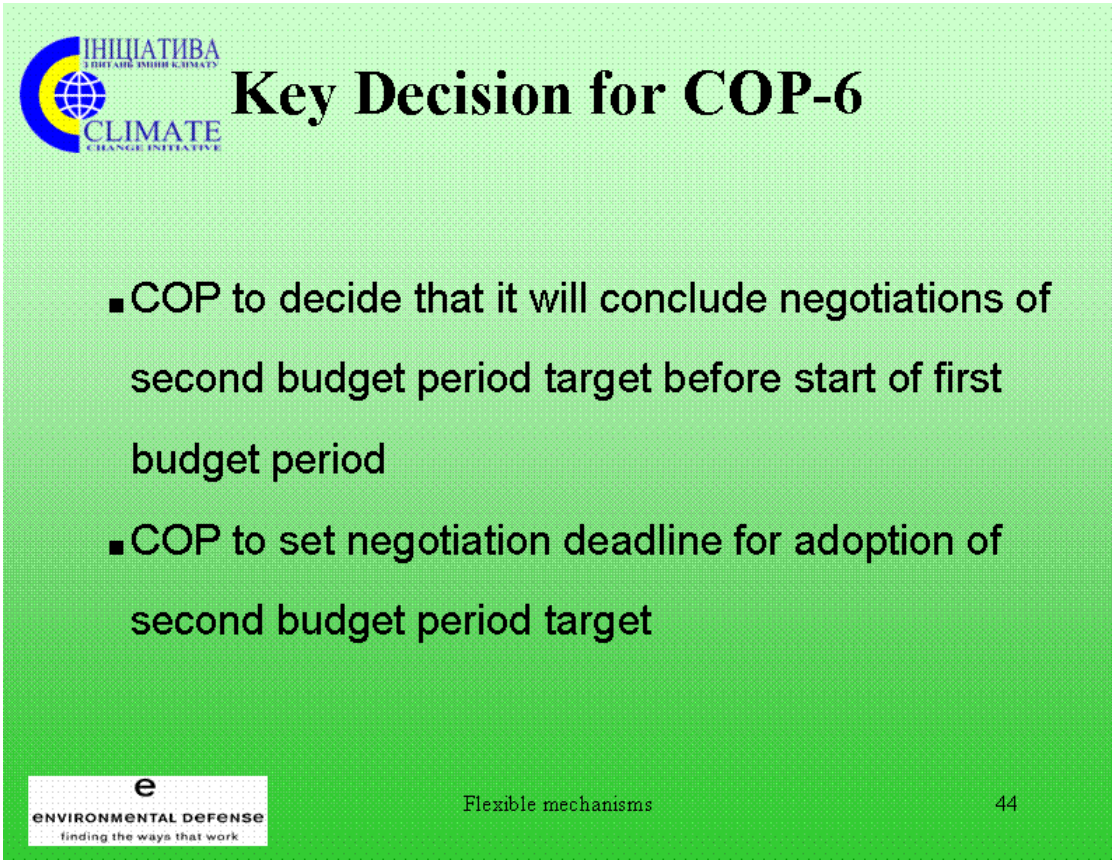
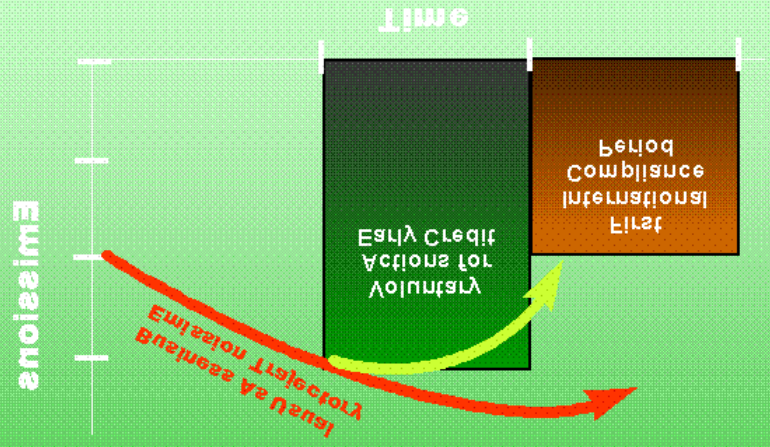
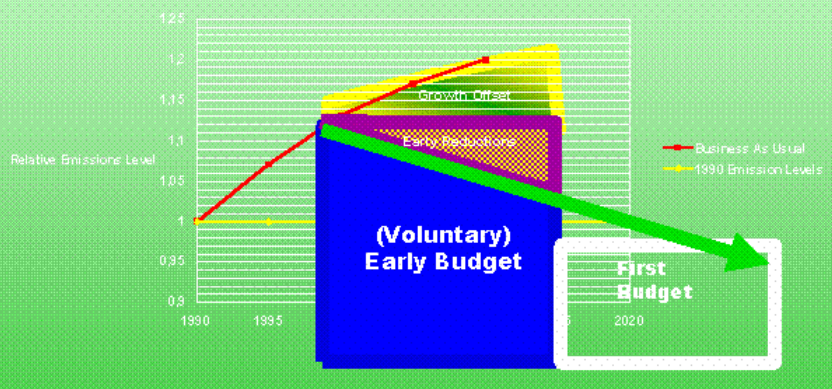

Key Decision for COP-6
COP to decide that it will conclude negotiations of second budget period target before start of first budget period
COP to set negotiation deadline for adoption of second budget period target
ENVIRONMENTAL DEFENSE
finding the ways that work
Flexible mechanisms
44

THE CLIMATE POLICY CHALLENGE



Flexible mechanisms 45

Early Allocation For Early Actions



Source: EDF

Flexible mechanisms 46

Learning-By-Doing

- Novgorod Project: Technical Issues
- Investment Facility
- Legal and Institutional Issues
- Compliance Reserve
- Forward Sales

ENVIRONMENTAL DEFENSE finding the ways that work

Flexible mechanisms 47

Conclusion: Cooperative Mechanisms

- Cooperative Mechanisms have potential to improve environmental performance, spur technology transfer, address economics
- Minimum elements need work!
  - transparent institutions
  - maximize competition in favor of environmental performance and reduced cost

ENVIRONMENTAL DEFENSE finding the ways that work

Flexible mechanisms 48

Session 3: International Climate Change Negotiations

- **General Objectives:**

  Session 3 is an introduction to the climate change negotiations from Ukraine's perspective. It seeks to give participants an understanding of the unique challenges and opportunities facing Ukraine and other economies-in-transition, and the potential importance of international emissions trading provisions for the country.

  Topics that should be addressed include:

  - Historical perspective on Ukraine's participation (i.e., negotiators, ministerial affiliation, etc.)
  - Ukraine's economic transition since 1990 Kyoto Protocol base year
  - A status report on other economies-in-transition
  - The role of "hot air" in international emissions trading
  - The role of joint implementation in the country
  - Estimates of future economic development
  - Estimates of future GHG emissions

  By the end of the session, participants should have a basic understanding of the following:

  - Ukraine's participation in climate change negotiations
  - The country's commitments under the Kyoto protocol
  - Special concerns about flexibility mechanisms that are relevant to the country.

- **Activities:** Presentation, followed by period of question and answer
- **Total Time:** 60 minutes

Flexible Mechanisms International Negotiation Process

Olexandr Belov

Certifiable Climate Change Transactions

Session 3

Session Overview

- Overview of the Convention
- Overview of the Kyoto Protocol
- Financing and flexibility mechanisms
- Flexibility mechanisms
- International negotiation process

UNFCCC Ratifications

1992 - adoption and signing

1994 - came into force

As of December 1999

– Ratification of the Convention = 181 countries + EU

Objective of the Convention

"Stabilisation of the greenhouse gas concentrations in the atmosphere at the level that would prevent dangerous anthropogenic interference with the climate system."

"… Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change…"

(Article 2 of the Convention)

Differentiation among Parties

- Annex I countries
  - (OECD + countries with economies in transition)
- Annex II countries
  - (OECD)
- Non-annex I countries
  - (developing countries)
- Least developed countries

Differentiated Commitments

- All Parties will prepare and submit national communications, which should contain:
  - **Inventories of greenhouse gas sources and sinks**
  - **Programmes containing policies & measures to mitigate and adapt to climate change**
- Annex I Parties (developed) should take the lead *by aiming* to stabilise and reduce their emissions of carbon dioxide to 1990 levels by the year 2000 *(few will do so)*.

Differentiated Commitments (ctd.)

- Annex II Parties (OECD) must contribute funding to the financial mechanism so developing countries can implement the Convention.
- Annex II Parties will also promote and finance the transfer of environmentally sound technologies, particularly for developing countries

Structure of the Convention

- Conference of Parties
- Subsidiary Bodies
- Secretariat
- COP Bureau
- Financing mechanism
- Ad Hoc Groups

Kyoto Protocol Signatories

As of December 1999

- Signatories to the Kyoto Protocol = 84 countries + EEC
- Only 22 ratifications (primarily small island, Central and South American, and FSU states)

To enter into force, the Kyoto Protocol requires ratification by no less than 55 Parties, which account for at least 55% of 1990 Annex I emissions of carbon dioxide

Elements of the Kyoto Protocol

- New *legally binding* GHG emission reduction commitments for industrialised countries
- Cooperative Implementation Mechanisms
- New and additional financial resources to developing countries
- No new commitments for developing countries

Commitments of the Kyoto Protocol

- The overall emission reduction target for Annex 1 Parties as a group is at least 5 percent below 1990 levels to be achieved by the commitment period 2008 to 2012 (an average over the five years).
- The negotiated targets for individual Annex I Parties is included in Annex B of the Protocol.

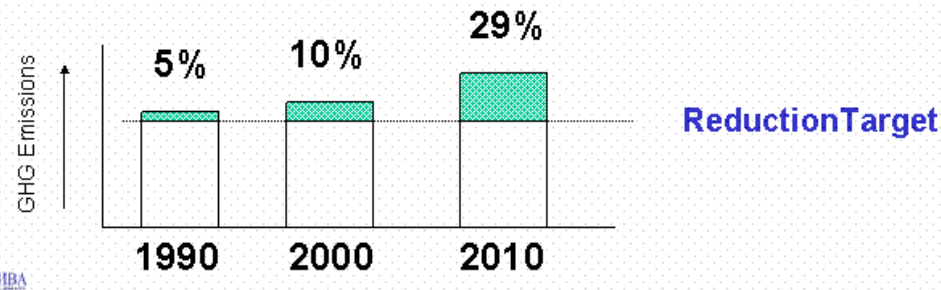
Selected Quantified Emission Limitations

Industrialized Countries		Economies in Transition	
• Australia	108	• Bulgaria	92
• Canada	94	• Baltics	92
• EC bubble	92	• Croatia	95
• (Germany	75)	• Czech Republic	92
• (Portugal	140)	• Hungary	94
• Japan	94	• Poland	94
• Norway	101	• Romania	92
• New Zealand	100	• Russia	100
• USA	93	• Ukraine	100

Emission Reduction Targets

Actual depth of the cut

- With increasing energy use, target #'s for 2008-2012 based on 1990 data are greater than they appear - 5% in 1990 vs ~29% in 2010



International Negotations

Slide 13

Commitments of the Kyoto Protocol (ctd.)

- In meeting commitments, an Annex I Party will implement national policies and measures aimed at reducing domestic emissions during the commitment period to a level less than or equal to its 'assigned amount' (AA) under the Protocol
- Additionally, each may supplement domestic reductions with credits for reductions achieved abroad

International Negotations

Slide 14

Selected Financial Mechanisms

- Global Environment Facility (GEF)
- Multilateral Agencies and Development Banks
- Bilateral Agencies
- Selected Large Private Sector Companies
- Flexibility Mechanisms (JI, emissions trading, bubbling)

Global Environment Facility

- The Global Environment Facility (GEF) provides grant and concessional funds to developing countries and those with economies in transition for activities that aim to protect the global environment and achieve the Convention's objectives.
- GEF supports the full costs of national communications preparation, as well as "agreed incremental costs" of mitigation and adaptation measures and projects. Technical assistance and capacity building activities are also supported by the GEF.
- Projects supported by the GEF must be country driven and based on national development priorities.

GEF Operations

- GEF has three Implementing Agencies:
  - United Nations Development Programme (UNDP);
  - United Nations Environment Programme (UNEP); and
  - The World Bank (IBRD/IFC).
- The GEF Operational Program contains four focal areas:
  - Biological Diversity
  - **Climate Change**
  - International Waters
  - Ozone Depletion

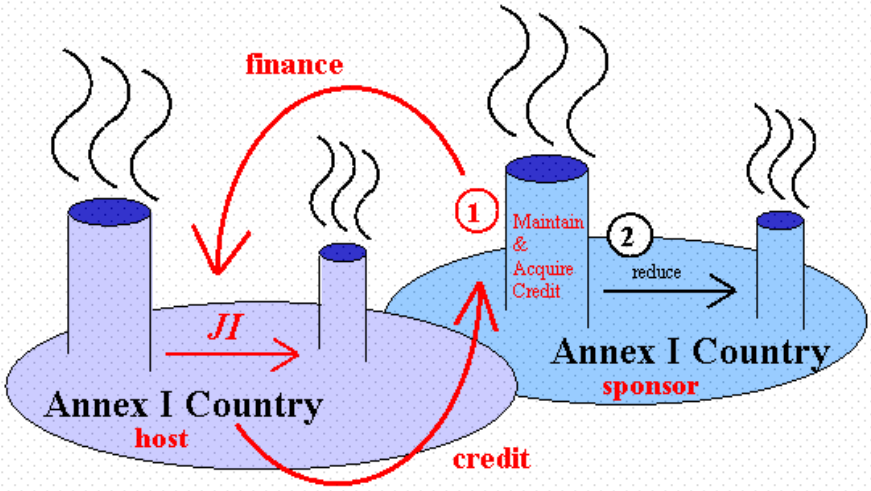
Activities Implemented Jointly (AIJ)

AIJ under the Pilot Phase

- AIJ pilot phase was established at the first meeting of the COP in Berlin in 1995. (Decision 5/CP.1)
- Emission reductions realized during the pilot phase can not be used to meet reduction commitments under the Protocol.
- The primary purpose of the pilot phase is for all Parties to "learn by doing" and thus gain experience with AIJ.
- As of early 1999, approximately 123 AIJ projects are under implementation or being planned (JIQ, 1999) of which 40 are in Non-Annex I countries.

The JI Transaction

Annex I ↔ Annex I



Mechanisms for Implementation

Joint Implementation (JI) ctd.

- Ideal JI project
  - Domestic regulation in investor country A leads corporation X to invest in technology-transfer project which reduces emissions in host country B
  - Corporation X saves $, Country B receives investment and technology, resulted in decreased emissions - a “win-win” scenario
- Possible only if
  - marginal cost to reduce x unit of GHG in investor Country A is significantly higher than in host Country B
  - mechanisms in Country B are in place to measure, monitor and certify GHG reductions resulting from investment by corporation X in Country A
  - mechanisms, methodologies and institutions are in place to oversee projects and credits

Mechanisms for Implementation
Joint Implementation (JI) ctd.

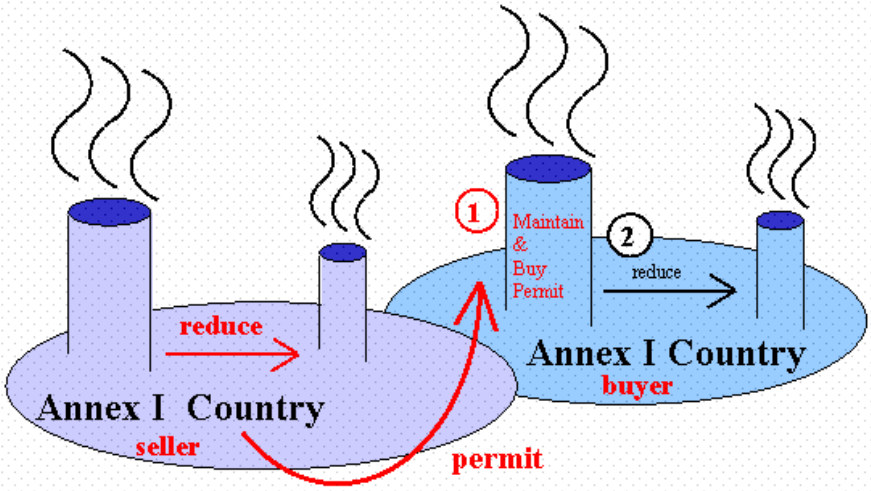
- **Outstanding issues** (building confidence)
  - allowable emissions must be allocated amongst participants
  - requires definition of appropriate "part" of country's emission reduction commitment
  - relies on outstanding issues related to certification, verification and compliance

Mechanisms for Implementation
Emissions Trading

- The traded quantity is a part of the assigned amount of the selling Party: measured in tons CO_2-equivalent
- All six gases treated interchangeably. Allowances valid for: CO_2, CH_4, N_2O, HFCs, PFCs, SF_6
- Trades might be negotiated even before first budget periods.
- Trades might involve national governments and any other government-endorsed legal entity (for example, if national trading system is in place).

The Emissions Trading Transaction

Annex I ↔ Annex I



Mechanisms for Implementation

Emissions trading (ctd.)

Compliance and Liability:

- Who is responsible for traded allowances if selling Party is not in compliance with it's target?
- Parties participating in trading must have strong inventory monitoring system in place.
- Eligibility requirements might help ensure this:
  - **meets standards for emissions data quality**
  - **has comprehensive and transparent inventory system**
  - **fulfils reporting requirements**
  - **has adopted and enforced compliance regime**
  - **has established a "compliance reserve"**

Mechanisms for Implementation

Emissions trading (ctd.)

Compliance and Liability: **Possible liability regimes**

- **"Seller-beware"**
  - seller takes risk that it has oversold allowances and jeopardized its compliance
  - buyer is assured that allowances are valid

Makes allowances fully fungible, market more straightforward

- **"Buyer-beware"**
  - if seller is non-compliant, traded allowances are invalid
  - buyer has purchased allowances that might be useless

Provides a disincentive to purchase from potential non-compliers

- **"Shared-liability"**
  - discounting of allowances sold by non-compliers

Experience from JI Projects Implementation (barriers)

- No climate change legal framework in the majority of countries
- Complicity of baseline and economic/environmental ration determination
- Skeptical attitudes of governments

Складові розробки проекту

- Baseline determination
- Development of alternative scenario
- Environmental and economic additionality
- Monitoring, verification and certification

International negotiation process

- EU countries + and some CEU
-"Umbrella group"
-"Group-77" + China
-OPEC countries
-Small island states

International negotiation process

On-going is the discussion of:

supplementarity, baseline, additionality, monitoring, verification, certification,fungibility, liability, legal entities role, transaction fees, adaptation funds, geofraphical distribution, limited “hot air” trading

What is expected from COP- 6

- Promote the Kyoto Protocol ratification by Annex 1 countries

- Developing countries contribution into Convention implementation

- Complete the Buenos-Aires Action Plan

Session 4: Design & Regulation of Emissions Markets

- **General Objectives:**

  Session 4 is an introduction to the design and regulation of emissions markets, from the perspective of a governmental official responsible for implementing such a program. It seeks to provide participants with an understanding of the concerns of such a regulator, to insure that the markets provide legitimate and real emissions reductions.

  Topics that should be addressed include:

  - Setting environmental goals
  - Collecting and verifying emissions data
  - Recording market transactions
  - Conducting compliance checks
  - Enforcing penalties for non-compliance
  - Establishing monitoring and reporting systems
  - Evaluating regulatory performance

  By the end of the session, participants should have a basic understanding of the following:

  - A regulator's perspective on how environmental markets should work
  - The critical design elements necessary to ensure that such markets lead to real emission reductions

- **Activities:** Presentation, followed by period of question and answer

- **Total Time:** 60 minutes

History of Emission Trading in the US and Future Applications

Jeremy Schreifels

Certifiable Climate Change Transactions
Session 4

Main points

- Evolution of emission trading in the US
- Design and results of US SO_2 Emission Trading Program
- Next generation of emission trading

Background: Traditional Regulation of Emissions

- Traditional air pollution control requirements
  - Technology requirements - Air quality benefits were achieved, but costs were high and there were few incentives for innovation or for sources to go beyond environmental requirements.
  - Emission rates - Allowed some flexibility for sources to choose controls but did not ensure a specific level of environmental protection since sources could increase production.

Adding Flexibility to Reduce Costs and Increase Benefits

- Early emission trading (bubbles, offsets, ERCs) added flexibility but...
  - High transaction costs.
    - » Each trade required extensive study to develop baselines.
    - » Each trade was negotiated then extensively reviewed by EPA to ensure net emission reduction.
  - Low satisfaction.
    - » Anyway credits: environmental groups did not want credit granted for actions taken by companies that would have been taken regardless of environmental impacts.

SO_2 Cap and Trade Program: A New Approach

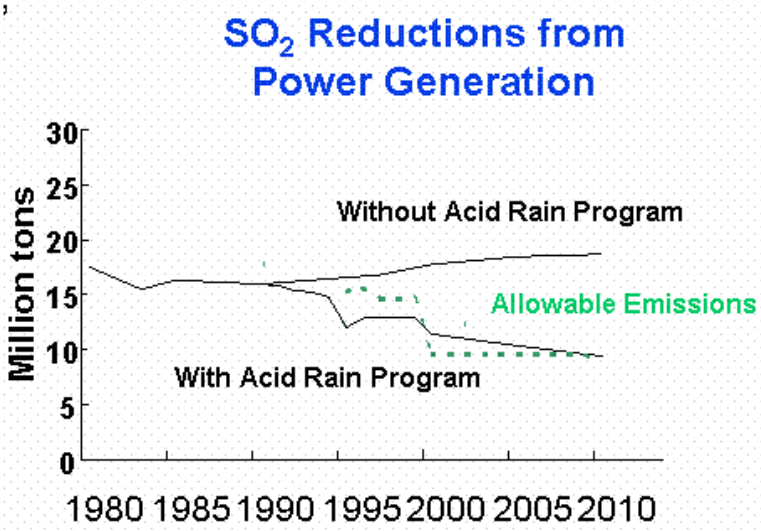
- Set goals in terms of allowable emissions
- Reduced and capped total emissions, ensuring attainment and maintenance
- Required measurement and reporting of all emissions

SO_2 Cap and Trade Program: A New Approach (continued)

- Allowed compliance flexibility, including emission trading
  - Encouraged innovation
  - Reduced costs
- Established automatic financial penalties and allowance reductions to assure compliance
- Retained requirements to protect local air quality, regardless of trading

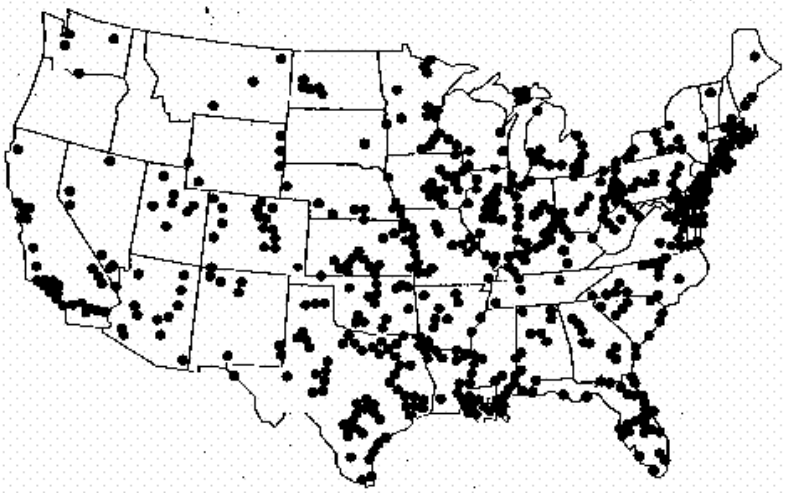
Goal of SO_2 Program as Directed by Congress in 1990

- Protect ecosystems, materials, visibility and public health from the effects of acid rain.
- Reduce SO_2 emissions by 8.5 million tons from power generation through "cap and trade" mechanism.



Assigning Responsibility

Over 2,000 sources affected



Operating the Program: Source Responsibilities

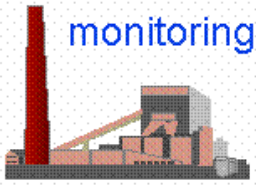
- Sources develop compliance strategy
  - fuel switching, SO_2 scrubbers, efficiency, renewables, trading
- Sources monitor & report all hourly emissions
  - install and maintain monitors (coal, oil, gas)
  - daily, quarterly, and annual performance tests
  - submit hourly emissions data and performance test results to EPA quarterly
- Sources may trade allowances, but must hold sufficient allowances to cover annual emissions

Operating the Program: EPA Role

- Collect, verify, and publish emissions data
- Record official allowance transfers and account balances
- Conduct annual compliance check (reconciliation)
- Enforce penalties for non-compliance

Emissions Monitoring and Reporting

Source installs and maintains monitoring systems



Source electronically submits hourly emissions data (SO_2, NO_X, CO_2) each quarter

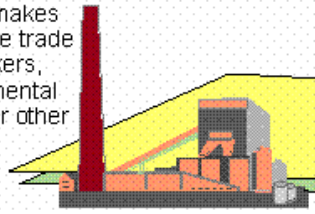
EPA /States audit monitoring systems

EPA provides feedback to source

EPA processes, quality assures, and reports data

Allowance Transfer Process

Source makes allowance trade with brokers, environmental groups,or other sources



Then mail trade information to EPA

EPA sends transfer confirmation to each trader, posts on the web site daily

EPA enters trade information into the Allowance Tracking System

How was the emission trading market created?

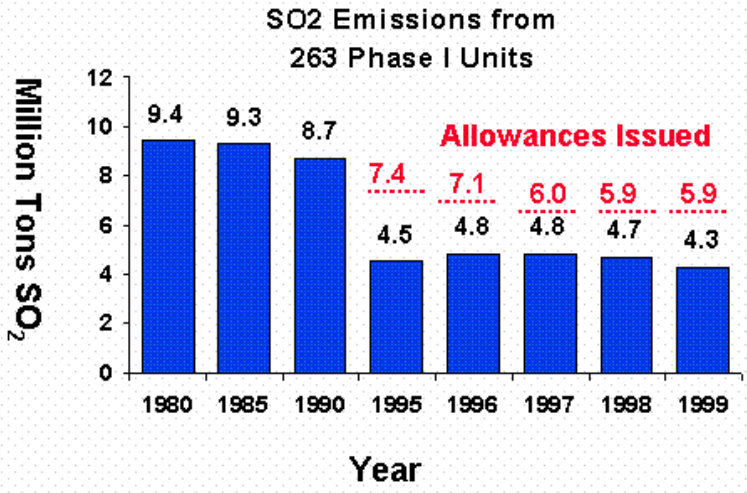
- Market was created to reduce costs (for sources, government and consumers)
- EPA established rules for the market:
  - stringent monitoring and reporting
  - allowance accounting and transfer procedures
  - flexibility in compliance options
- EPA developed tracking systems (ATS, ETS)
- Trades take place among sources/brokers on the telephone, then registered in ATS
- Foundation for market is confidence:
  - that the government subjects all sources to the same compliance obligations and enforcement penalties

Determining and Ensuring Compliance

- **Annual Reconciliation**
  - EPA compares allowances (ATS) with actual emissions (ETS) to determine compliance (sources must have one allowance for each ton of SO_2 emitted)
  - After December 31, sources have 60 days to complete final trades
- **Enforce penalties for excess emissions**
  - Automatic offset (deduction of allowances from next year's account)
  - Automatic financial penalty--currently $2,682/ton
  - Additional civil and criminal penalties

Results: Phase I Emissions

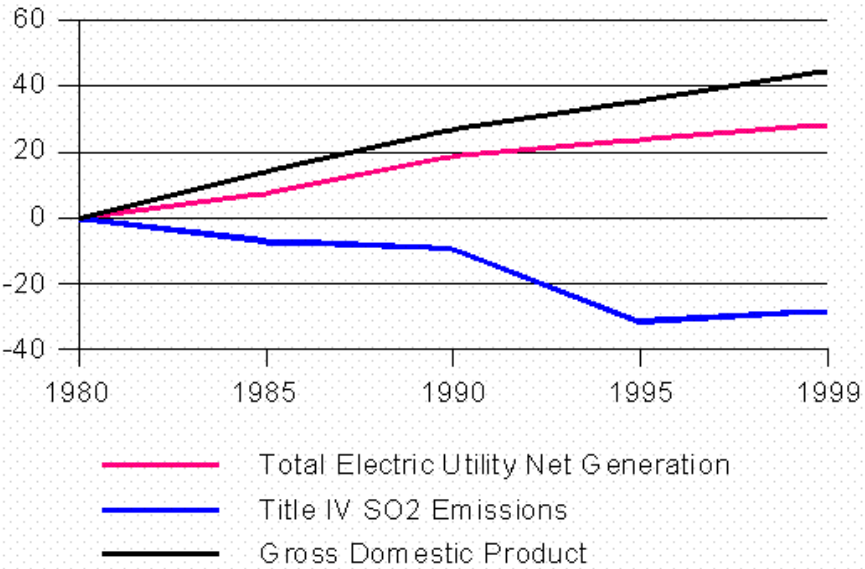
- Emission reductions began on time
- Sources have achieved 100% compliance
- Reductions were greater than expected



Emission Markets Design and Regualtion

15

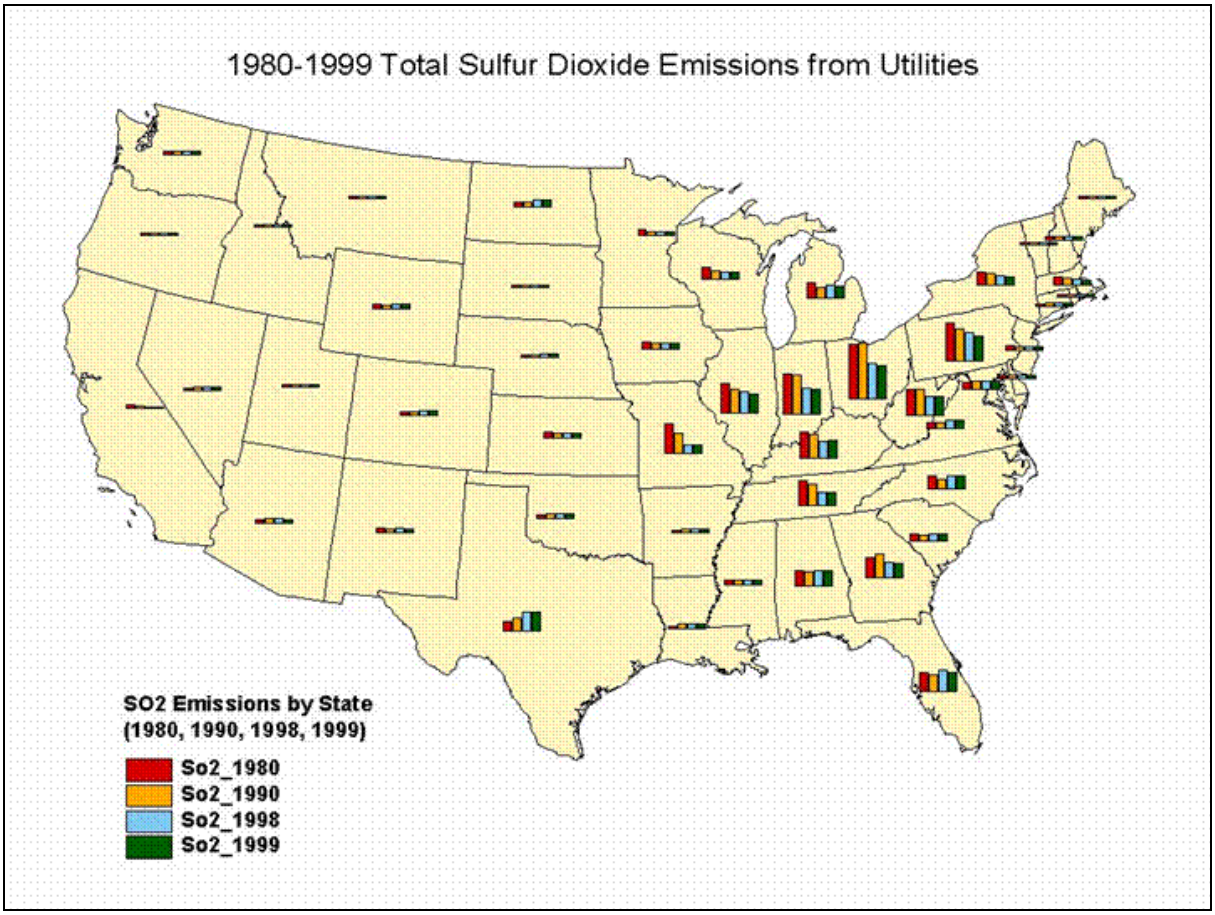
SO_2 Emissions Declined while Electricity Produced and GDP Increased

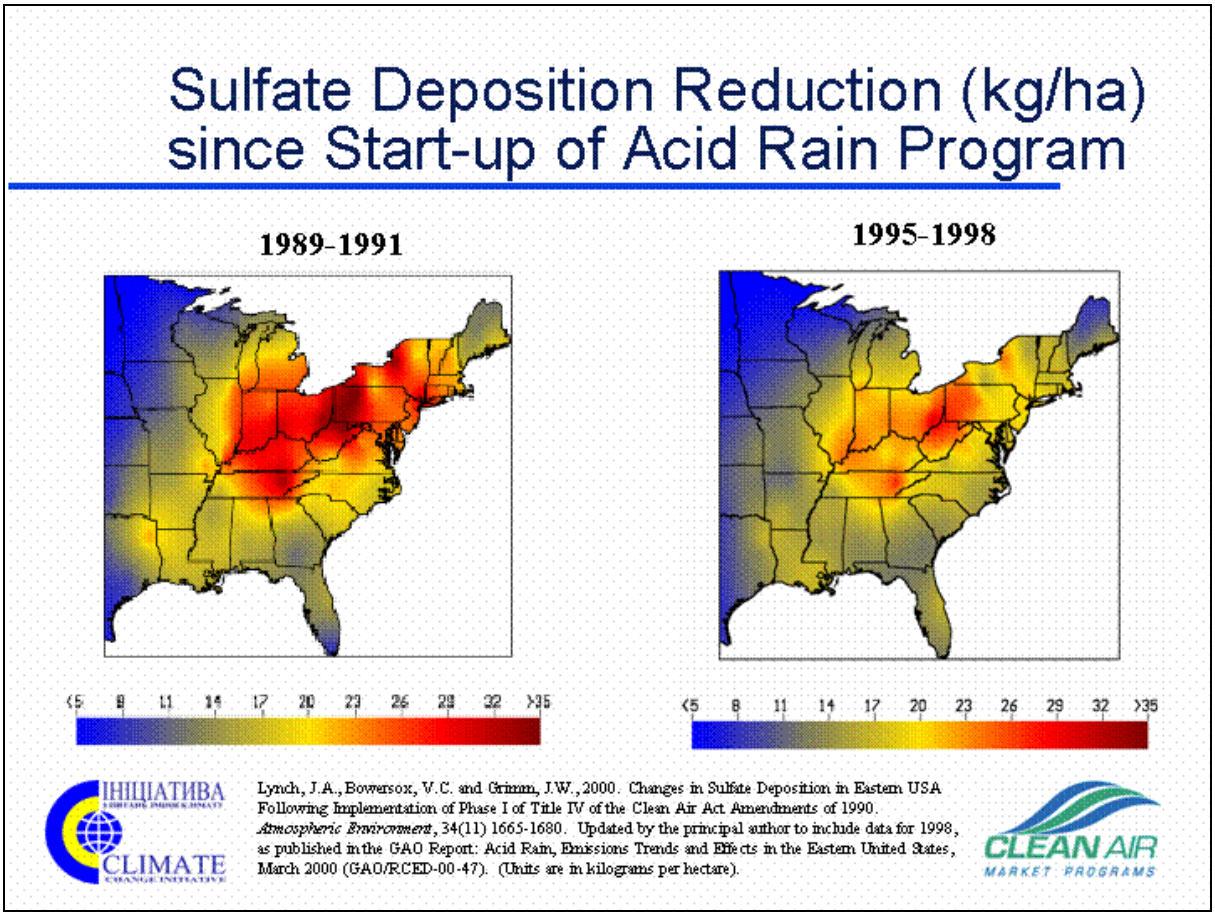


Sources: Bureau of Economic Analysis, Energy Information Administration, Acid Rain Program (EPA)

Emission Markets Design and Regualtion

16

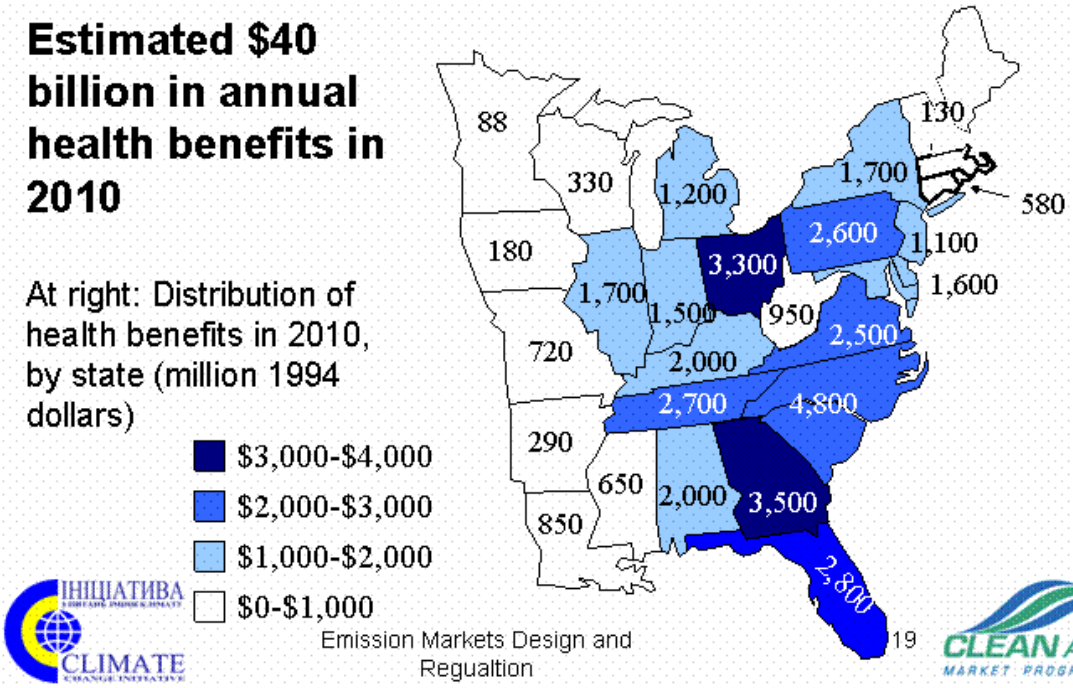

1980-1999 Total Sulfur Dioxide Emissions from Utilities
SO2 Emissions by State
(1980, 1990, 1998, 1999)
So2_1980
So2_1990
So2_1998
So2_1999


Sulfate Deposition Reduction (kg/ha)
since Start-up of Acid Rain Program
1989-1991
1995-1998
<5 8 11 14 17 20 23 26 29 32 >35
<5 8 11 14 17 20 23 26 29 32 >35
Lynch, J.A., Bowersox, V.C. and Grimm, J.W., 2000. Changes in Sulfate Deposition in Eastern USA Following Implementation of Phase I of Title IV of the Clean Air Act Amendments of 1990. Atmospheric Environment, 34(11) 1665-1680. Updated by the principal author to include data for 1998, as published in the GAO Report: Acid Rain, Emissions Trends and Effects in the Eastern United States, March 2000 (GAO/RCED-00-47). (Units are in kilograms per hectare).

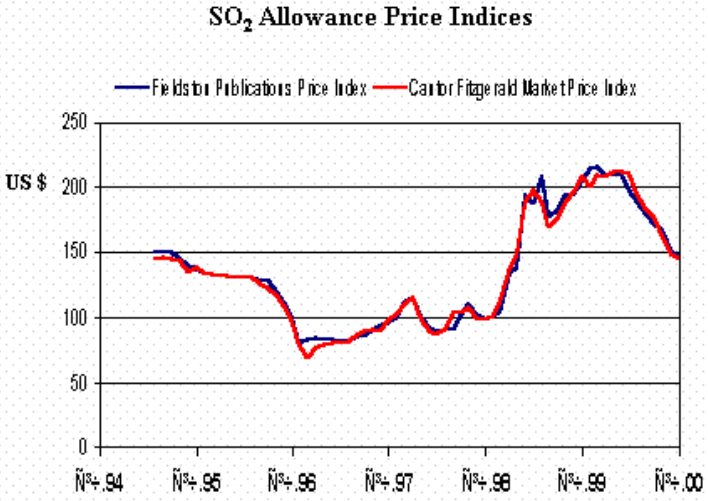
Health Benefits of Title IV SO_2 Reductions

Estimated $40 billion in annual health benefits in 2010

At right: Distribution of health benefits in 2010, by state (million 1994 dollars)



The SO_2 Allowance Market

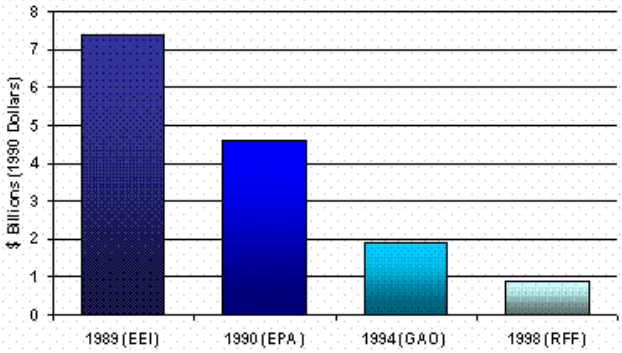


- **Since 1994, over 85 million SO_2 allowances have been traded**
- **EPA has executed over 9,000 transactions**
- **Approximately 35% of all SO_2 allowances have been traded between economically distinct organizations**

Source: Clean Air Markets Division

Expected Costs by 2010 - Less than Predicted

Estimated Annual Cost of Full Acid Rain Program in 2010



EEI = Edison Electric Institute (no trading)
EPA = Environmental Protection Agency
GAO = General Accounting Office
RFF = Resources for the Future

- Competition across all emission reduction options
- Markets provide continuous incentives for innovation
- Banking provides timing flexibility for emission reductions
- Markets reveal true costs

Keys to a Successful Cap and Trade Program

- Cap
  - Protects environment by reducing emissions & preventing increases
  - Provides predictability for the market by fixing quantity
- Accountability
  - Promotes accurate, complete and transparent emissions data
  - Predictable consequences for noncompliance
- Simplicity
  - Minimizes barriers to trade ensures efficient operation
  - Maintains low transaction costs and high volume/liquidity
  - Lowers government and industry costs
  - Provides incentives to innovate

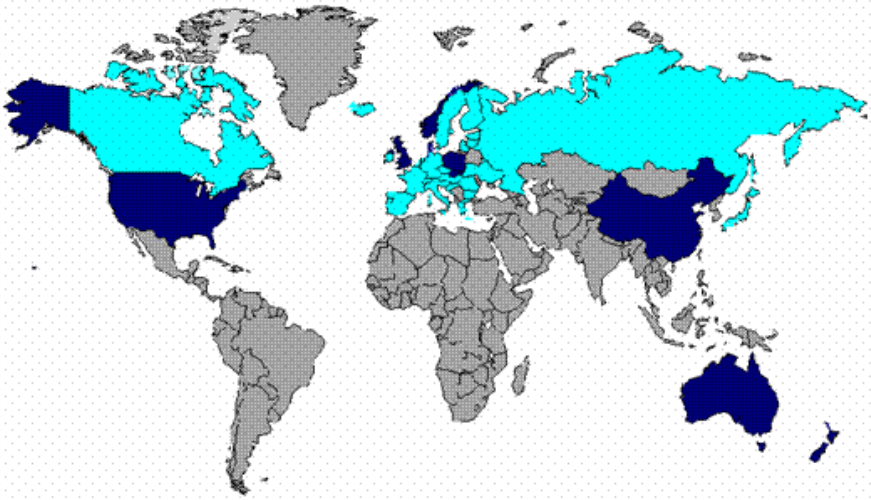
Market Mechanisms Under International Consideration for GHG Reductions

- Article 17: Emission Trading: 'Cap & Trade'
  - Emission trading among countries with targets
- Article 6: Joint Implementation
  - Two countries with targets transfer units based on investment in emission reduction project
- Article 12: Clean Development Mechanism
  - Country with target acquires units created from investing in an emission reduction project in developing country (no target)

Cap and Trade Use Worldwide

- In 1995, the US Acid Rain Program was the only national cap and trade program for controlling air pollution in the world
- Today, cap and trade programs are being seriously considered in at least 9 countries to control domestic SO_2, NO_x, or greenhouse gas emissions
- Over 30 countries are preparing to participate in international greenhouse gas trading

Countries Considering Cap and Trade Programs



Countries developing or considering developing domestic cap and trade programs (SO_2, NO_x or greenhouse gases) .

Countries considering international greenhouse gas emission trading

Visit the Clean Air Markets Web site:

current address: www.epa.gov/acidrain

new address: www.epa.gov/airmarkets

Session 5: Structure & Usage of Emissions Markets

- **General Objectives:**

  Session 5 is an introduction to the structure and usage of emissions markets, from the perspective of market participants. This includes the views of both those who will provide the emission reductions, those who will purchase emission credits based on such reductions, and emission brokers. It seeks to provide participants with an understanding that the market itself can affect the activities of those who participate in it.

  Topics that should be addressed include:

  - Project investment in energy efficiency
  - The role of carbon credits in project investment
  - Seller/buyer liability issues
  - Carbon credit pricing
  - The development of a market in carbon credits
  - The role of emission brokers
  - Reporting requirements
  - Verification procedures

  By the end of the session, participants should have a basic understanding of the following:

  - How the market operates from a user's perspective
  - The role of carbon credits in project investment
  - Options for gaining access to carbon credit markets

- **Activities:** Presentation, followed by period of question and answer
- **Total Time:** 45 minutes

Ukrainian View of Market Mechanisms

Vadim Diukanov
Ukrainian Society for Sustainable Development

Certifiable Climate Change Transactions
Session 5

Can successes in the use of market mechanisms in the US be duplicated in Ukraine?

- Analytical question: What are the legal and administrative predicates for market mechanisms?
- Case study: Are these predicates present in Ukraine, or will they have to be created?
- Findings: What is missing in Ukraine that will have to be created in order to introduce market mechanisms (i.e., emissions trading)?

2

"Command-and-control": a term used to describe rules that compel specific parties

- to perform specific acts (e.g., to install a specific emission control technology), and/or
- to refrain from specific acts (e.g., to not exceed certain permit limitations or standards)
- enforced by penalty, never positive incentives

3

"Market-based approach": a term used to describe programs that achieve environmental goals through the voluntary actions of parties in response to incentives

- It expands the flexibility of the regulatory controls
- It allows a market mechanism to set values on a continuing basis
- It relies on the voluntary behavior of parties within that market to choose their profit-maximizing alternative, so that each party's compliance choices will be driven by his financial incentives

4

Market-based instruments can be classified into two principal types, as to whether they set price or quantity as the independent variable

- "Externality charges and emission fees" assign a price to emissions, which their source must pay; the amount paid represents the environmental (externality)cost, so that the market will allocate the quantity of emissions as that price determines
- "Marketable emission rights" set a quantitative permit or standard for the externality and provide a mechanism for regulated parties to trade their emission rights with other parties, so that the market sets the price of the rights

5

Как работает система торговли снижениями выбросов
How Credit Trading Works

•Установи свой базовый (исходный) уровень выбросов

Establish your baseline

•Задокуметируй мероприятия, приводящие к снижению выбросов

Document credit generating activity

•Получи подтверждение расчетов снижений от органов охраны окружающей среды

Get regulatory quantification

•Получи сертификат снижения выбросов

Get certification

•Продай сертифицированные снижения выбросов

Either sell emission reduction credits

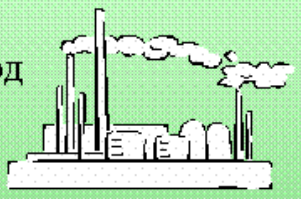
или/or

Положи сертифицированные снижения в Банк снижений выбросов для использования в будущем

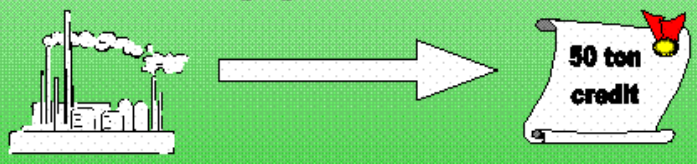
Bank emission reduction credits for future use

Как работает система торговли снижениями выбросов
How Credit Trading Works

Установи базовый уровень выбросов…
…Текущий уровень выбросов – 500 т в год
Establish the baseline emissions……
current emissions are 500 tons/year



Усовершенствуй оборудование, и выбросы снизятся до 450 т/г
Install better equipment and emissions decline to 450 tons/year.

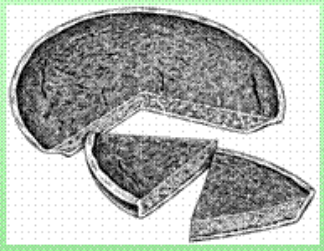


В результате возникает снижение выбросов. «Настоящим сертификатом подтверждается, что Предприятие N снизило выбросы на 50 т ниже требуемого уровня. Предприятие N может использовать это сертифицированное снижение для компенсации определенных выбросов в атмосферу.»
Джон Смит, Министр по охране окружающей среды

Как работает система торговли квотами на выброс
How Allowance Trading Works

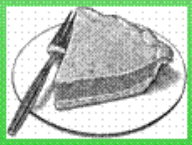
- **Установи свой базовый уровень выбросов(начальное распределение квот)** Establish your baseline (allocation)
- **Создай почти идеальную систему непрерывного мониторинга выбросов** Create almost perfect, continuous emissions monitoring system
- **Продай уменьшения выбросов или обязуйся уменьшить выбросы** Sell reductions or promise to create reductions
- **Задокументируй уменьшение выбросов**
  Document reduction
- **Докажи выполнение своих обязательств и соблюдение правил**
  Demonstrate compliance

Как работает система торговли квотами на выброс
How Allowance Trading Works



Установка базового уровня (начальное распределение квот). Какие объемы квот выдать различным предприятиям? На ситуации какого года базировать это распределение?

Это главная проблема системы торговли квотами. По какому принципу разделить пирог? Как быть в будущем с новыми источниками или с модификацией существующих?



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Изменение уровня производства в разные годы и разные подходы приводят к разным начальным распределениям квот. Поскольку каждый кусок «пирога квот» можно продать, речь по существу идет о распределении денег.

Defining and distributing emission rights

- The term “emissions trading” only describes the action that takes place, not the nature of the thing traded.
- To refer to the thing actually traded one has to refer to an emission “right”
- In order for market to exist, the program must create an entitlement that is non-revocable outside predefined circumstances
- Since emission rights do not already exist, they have to be created

10

Properties of the emission right

- How are such rights earned (in case of credits) or created and allocated (in case of allowances)?
- What life span is assigned to the rights?
- What is their use, that is, what regulatory obligations do such rights offset or cancel?
- What temporal, geographical or other substantial constraints are there on their exchange?
- Who may own or hold them, and who is authorized to transact them on behalf of their owners or holders?
- What is the accounting method for transacting rights, and how are discrepancies reconciled?
- What are the penalties and other liabilities for violating the underlying regulatory provisions?

11

To assure that emission rights will have value, the administration of trading markets must be much more precise than CAC programs

- Monitoring: the system must produce consistent, high quality data on actual emissions
- Duplicate data sets: trading programs should not use compliance data reported by emitters as evidence of program success unless independently validated
- Enforcement: effective and rapid enforcement is essential. Without enforcement the market would not work because no party would have the need to buy credits and thus they would have no value
- Dispute resolution: establish a decision process to use in resolving disputes about use of rights

12

The benefits of trading should exceed the administrative costs

- Economists laid out a compelling mathematical case that trading can achieve a given level of emissions control more efficiently than a comparable CAC program
- Economists assume that trading has lower administrative costs than a CAC program

13

Session 6: Experience of Economies-in-Transition with Joint Implementation

- **General Objectives:**

  Session 6 is a more detailed examination of early JI and AIJ experience in economies-in-transition. A number of Scandinavian countries have invested heavily in JI projects in the Baltics, and other Western European countries have sought similar projects in Central and Eastern Europe. This session seeks to provide a more in-depth review of these JI projects, in conditions similar to those of Ukraine.

  Topics that should be addressed include:

  - A description of relevant JI and AIJ projects in CCE countries
  - An identification of the sponsor and host of relevant energy efficiency case studies
  - A description of the JI development process
  - A description of the financial arrangements, including transfers of carbon credits
  - Technical elements of these case studies, including baseline determination, monitoring procedures, etc.
  - A description of potential JI projects currently being considered in Ukraine
  - Lessons learned from other economies-in-transition for future JI in Ukraine

  By the end of the session, participants should have a basic understanding of the following:

  - The experience of JI and AIJ projects in economies-in-transition
  - Problems encountered in such countries hindering JI development
  - Lessons for future JI projects in Ukraine

- **Activities:** Presentation, followed by period of question and answer

- **Total Time:** 75 minutes

AIJ IN POLAND

Jolanta Galon-Kozakiewicz, Ph.D.
Joint Implementation Secretariat

Certifiable cliamte change transactions
Session 6

1

AIJ IN POLAND

- **Poland takes part in AIJ as a host country**
- **Currently,Poland–Norway and Poland-Netherlands projects under implementation**
- **Responsibilities of Secretariat-JI at EOCC in NFEP&WM:**
  - **monitoring of financial and ecological effects**
  - **reporting to the UNFCCC Secretariat**

2

POLAND-NORWAY AIJ PROJECTS

The total project consists of the following components:

- coal-to-gas conversion component:
  - modernisation of about 30 non-industrial boiler houses
- energy efficiency in new residential buildings component:
  - insulation of buildings and installation of energy efficient equipment

3

POLAND-NORWAY AIJ PROJECTS

- 22 projects under coal-to-gas conversion component
- 9 projects under energy efficiency in new residential buildings component
- 5 projects under coal-to-gas conversion component, specified in the list of stand-by
- All projects are located throughout Poland
- Different stages of implementation

4

COAL-TO-GAS CONVERSION COMPONENT

- Lifetime of activity and monitoring: 17 years
- Planned environmental benefits:
  209 099 tCO_2/year
- Project cost-effectiveness:
  4,6 - 64,2 USD/tCO_2
- Baseline:
  The level of the theoretical, new coal-fired boiler houses emission

5

ENERGY EFFICIENCY COMPONENT

- Lifetime of activity and monitoring: 50 years
- Planned environmental benefits:
  766 tCO_2/year
- Project cost-effectiveness:
  26,0 - 130,0 USD/tCO_2
- Baseline:
  The emission level of heating of the new residential buildings meeting Polish standards

6

FINANCING OF POLAND – NORWAY AIJ PROJECTS

- The grant of 25 million USD from the GEF
- 22 million USD from NFEP&WM, VFEP&WM, EPB and private investors in Poland
- AIJ factor:
  The grant of 1.1 million USD from the Government of Norway

7

POLAND-NETHERLANDS AIJ PROJECTS

- REDUCTION OF ATMOSPHERIC POLLUTION THROUGH MODERNISATION OF HEAT SUPPLY SYSTEM IN THE TOWN OF BYCZYNA
- SUSTAINABLE HEAT AND POWER FOR PUBLIC NETWORKS IN POLAND - PROJECT IN SZAMOTUŁY

8

BYCZYNA AIJ PROJECT

- Modernisation consists of application of 16 modern gas-fired boilers instead of existing coal and coke fired boilers and gasification of town
- 1998 - modernisation of 9 boiler houses
- 1999 - modernisation of 7 boiler houses

9

BYCZYNA AIJ PROJECT

- Lifetime of activity and monitoring: 15 years
- Planned environmental benefits:
  3 729 tCO_2/year
- Project cost-effectiveness:
  10 USD/tCO_2
- Baseline – emission level from old coal-fired boilers in 1997
- Cost: 632 000 USD
- AIJ factor: 446 000 USD – Dutch Government's grant

10

SZAMOTUŁY AIJ PROJECT

- Liquidation of one boiler house
- Coal to gas conversion in second boiler house
- Installation of cogeneration unit and automatic equipment
- Modernisation of heat supply network

- 1998 - gasification of boiler house and connection to network
- 1999 - installation of cogeneration unit and automatic equipment

11

SZAMOTUŁY AIJ PROJECT

- Lifetime of activity and monitoring: 15 years
- Planned environmental benefits:
  3 237 tCO_2/ year
- Project cost-effectiveness:
  30 USD/tCO_2
- Baseline – emission level from old coal-fired boilers in 1997
- Cost: 724 000 USD
- AIJ factor: 446 000 USD – Dutch Government's grant

12

ENVIRONMENTAL BENEFITS CO_2 EMISSION REDUCTION

- Coal-to-gas conversion component:
  209 098 tCO_2 x 17 years = 3 554 666 tCO_2
- Energy efficiency component:
  766 tCO_2 x 50 years = 38 300 tCO_2
- Project in Byczyna:
  3 729 tCO_2 x 15 years = 55 935 tCO_2
- Project in Szamotuły:
  3 237 tCO_2 x 15 years = 48 555 tCO_2
- TOTAL: 3 697 456 tCO_2

13

POLAND-SWITZERLAND AIJ PROJECT PROPOSALS

- MODERNISATION OF BOILER HOUSE IN THE A. MIELECKI HOSPITAL IN CHORZÓW
- MODERNISATION OF THE HEATING SYSTEM IN PSZCZYNA

14

CHORZÓW AIJ PROJECT

- Coal to gas conversion, cogeneration
- Planned environmental benefits:
  3 000 tCO_2/year
- Project cost-effectiveness:
  20 USD/tCO_2
- Cost: 1.5 mln USD
- AIJ factor: 0.5 mln USD – equipment, Swiss Government's grant
- Realisation: about 10 month

15

PSZCZYNA AIJ PROJECT

- coal to gas and oil conversion in 5 boiler houses (including one of high parameters)
- Planned environmental benefits:
  14 259 tCO_2/year
- Project cost-effectiveness:
  5 USD/tCO_2
- Cost: 2 mln USD
- AIJ factor: 1.5 mln USD – equipment, Swiss Government's grant
- Realisation: about 10 month

16

POLAND-NETHERLANDS JI PROJECT PROPOSALS

- REDUCTION OF METHANE EMISSIONS THROUGH LANDFILL BIOGAS UTILISATION AT TYCHY
- UTILISATION OF WOOD CHIPS FOR HEATING PURPOSES IN URBAN AREAS - THE DEMONSTRATION PLANT IN JELENIA GÓRA

17

TYCHY JI PROJECT

- Installation of system collecting the landfill biogas (annual estimated flow: 1,7 mln m^3)
- The production of heat and electricity on biogas basis
- Lifetime of activity and monitoring: 13 years
- Planned environmental benefits: 15 759 tCO_2/year
- Project cost-effectiveness: 5.24 USD/tCO_2
- Financing: 235 000 USD - Dutch Government's grant
- Realisation: November 1998 / 2000
- Credit shares:
  75% for Netherlands, 25% for Poland

18

JELENIA GÓRA JI PROJECT

- Installation of biomass-fired boiler at greenery
- Creation of Biomass Energy Information & Support Centre for dissemination information in the field of biomass energy
- Lifetime of activity and monitoring: 10 years
- Planned environmental benefits: 1 180 tCO_2/year
- Project cost-effectiveness: 0.5 USD/tCO_2
- Financing: 0.5 mln USD - Dutch Government's grant
- Realisation: November 1998 / 2000
- Credit shares:
  55% for Netherlands, 45% for Poland

19

POLAND-AUSTRALIAN JI PROJECT PROPOSALS

- Project in Raszyn:
  - rehabilitation of natural gas reticulation systems by inserting the nylon; estimated gas losses: 8 %
  - Planned environmental benefits: 9 500 tCO_2/year
- Project in Sochaczew:
  - coal to gas conversion in 79 centralised boiler houses
  - hot water and heat supply system
  - Planned environmental benefits:
    85 000 tCO_2/year
- Planned cost of both projects: 7.2 mln USD

20


POSITION OF POLAND
The delegation will support the proposal to close the JI pilot phase (AIJ) in 2000, concurrently with the initiation of the JI and the CDM.
In addition, the delegation will opt for a solution that will allow the initiation of the JI in the Annex I Parties in the 2000, and also enable the elongation of the AIJ in developing countries (as the supplement to CDM), to proceed in parallel with the JI initiation.
In case, an agreement concerning the precise start time of the JI in 2000 is unachievable, the delegation will chose a solution which ensures that the end of the pilot phase, together with the introduction of the JI, will occur no later than after the first joint session of Conference of Parties to UNFCCC and Meeting of Parties to the Kyoto Protocol.
21

Session 7: Experience of Country/Multilateral Investors with Joint Implementation

- **General Objectives:**

  Session 7 is an introduction to JI experience from the investors' point of view, including that of countries seeking to foster JI, AIJ and CDM projects, as well as funds established for such purposes (e.g., the World Bank's Prototype Carbon Fund [PCF]). It seeks to describe to participants the views of such funding sources, and their previous experience in Ukraine.

  Topics that should be addressed include:

  - Country-level funding sources available for JI project development (e.g., Netherlands, UK, Japan, etc.)
  - Multilateral funding sources (World Bank, IFC, GEF, etc.) for JI development
  - Public/private sector investment
  - PCF project criteria
  - UN assistance (UNCTAD/UNDP/UNEP)
  - EU programs (PHARE/TACIS)
  - Experience of funding sources in Ukraine

  By the end of the session, participants should have a basic understanding of the following:

  - Funding sources (outside private sector) which could assist in JI development
  - Investment criteria of these sources
  - Their experience in Ukraine

- **Activities:** Presentation, followed by period of question and answer

- **Total Time:** 75 minutes

British Energy experience with economic instruments in the UK

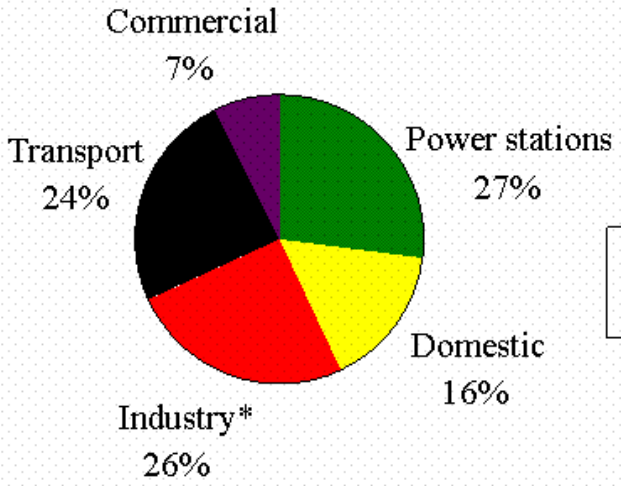
David Butler

Certifiable Climate Change Transactions

Session 7

British Energy

Sources of carbon emissions in the UK



UK emitted 156 Mt of carbon in 1998

British Energy

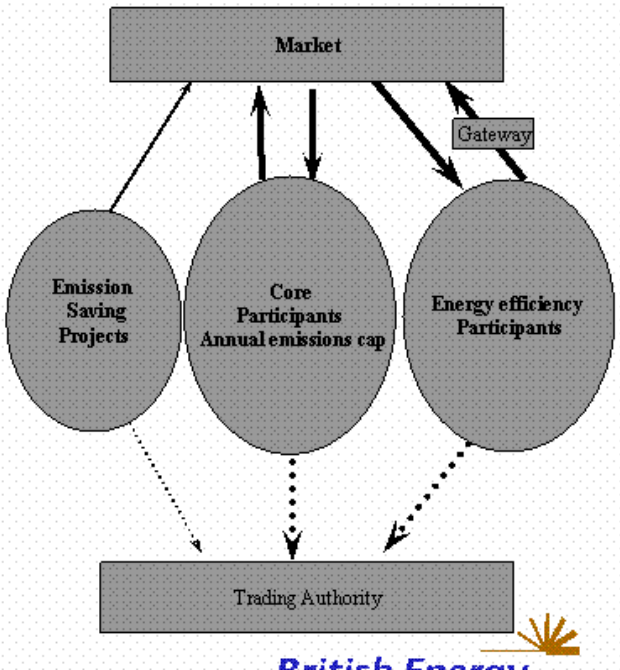
Benefits of participation

- Cost of meeting emission targets reduced
- Ability to profit from buying/selling tradable permits
- Rebate on taxes if agree to participate
- Opportunity to trade permits internationally
- Potential to develop trading expertise
- Preparation for future legislation
- Corporate positioning on environmental issues

British Energy

Methods of participation

- Participants agree an absolute carbon cap or efficiency target with Government
- Surplus/deficits can be traded
- Emission saving projects can also be used to generate permits as well
- Agreements period runs from 2001 to Kyoto

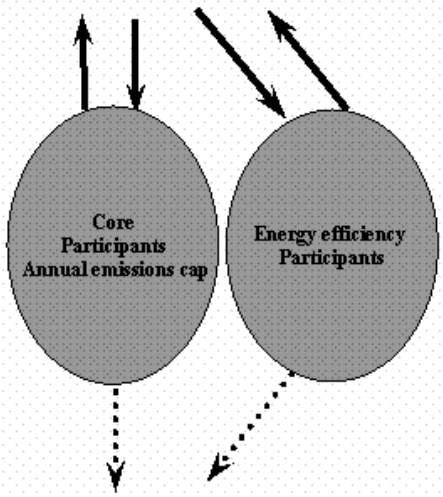


British Energy

Methods of participation

- absolute cap or efficiency target

- Companies in the "absolute" sector will receive free tradable permits that match an annual emissions target
- They will have an obligation to demonstrate that they have sufficient permits to cover emissions each year
- Firms which have agreed an energy efficiency target will not receive permits directly but will have the right to trade permits
- These firms can sell permits if they demonstrate their efficiency is below a target or can buy permits to bring them under a target

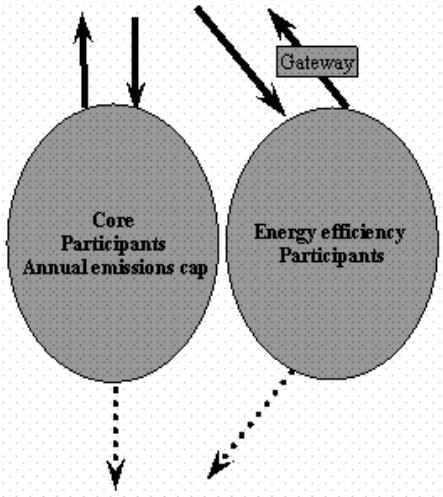


British Energy

Methods of participation

- the gateway between the two markets

- An efficiency based market could mean that the total number of permits in circulation would grow as economic output grows
- The ability of the trading scheme as a whole to demonstrate that it was reducing overall emissions could be compromised
- To prevent this a gateway will prevent sales out of the efficiency sector exceeding sales into it

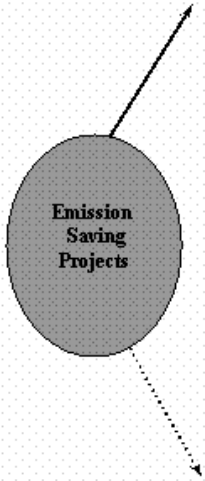


British Energy

Emission Saving Projects

The rules and guidelines for credit based projects must address the following:

- environmental benefit
- environmental integrity
- emission monitoring protocols and procedures
- data recording procedures
- accountability for leakage
- emission verification programme
- determination of emissions baseline



British Energy

Issues for fossil generators

- Opportunities
  - profit from sale of surplus permits as existing coal plant is replaced
  - avoid costs of meeting site environmental regulation by entering trading scheme and negotiating company reduction targets
  - can buy/generate cheap credits abroad and use them in the UK
  - scheme is potential barrier to new entrants
- Threats
  - stringent CO_2 reduction targets imposed by Government
  - interpretation of environmental regulations could restrict freedom to trade
  - scheme based on indirect participation of generators

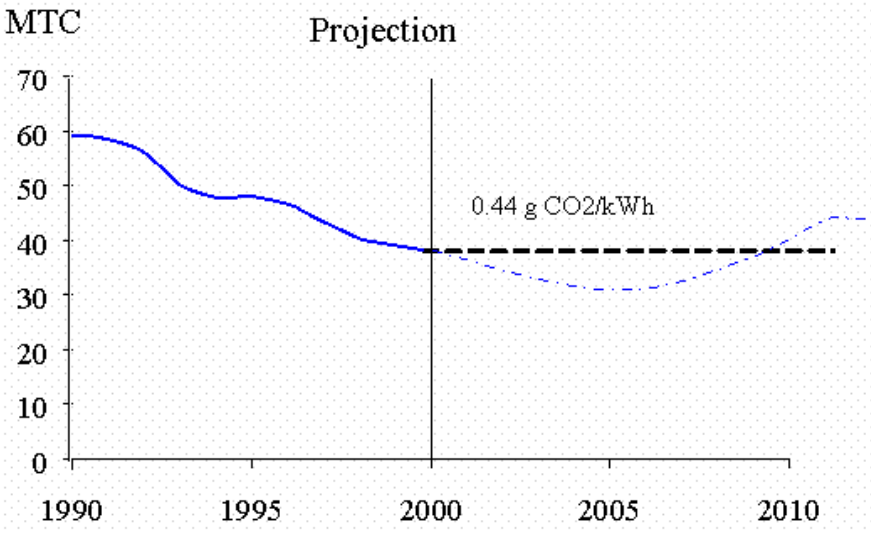
British Energy

Issues for nuclear generators

- Opportunities
  - scheme based on indirect participation of generators (ie electricity differentiated by its carbon content)
  - trading scheme creates carbon cap for other generators
- Threats
  - an indirect scheme that restricts differentiation to renewables and CHP, not nuclear or hydro
  - fossil generators make profits from trading excess permits - reverse of polluter pays principle

British Energy

UK ESI emissions - ensuring a net gain for the environment

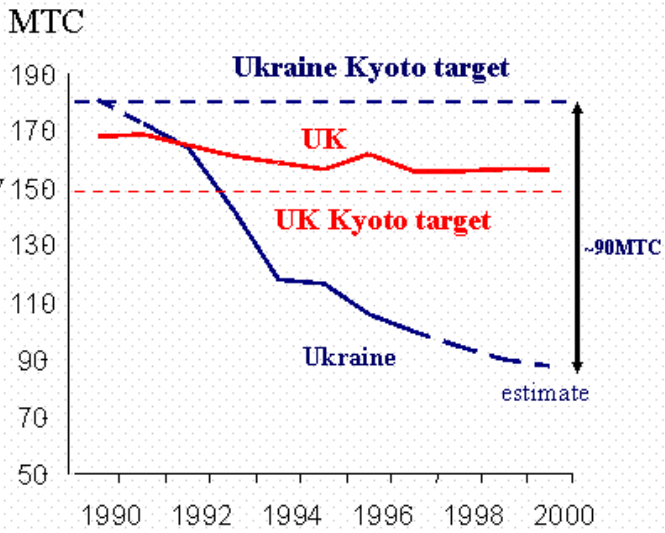


British Energy

National emissions

- How much of Ukrainian cuts are 'real' ?
- Russian study
  - 65% from collapse in economy
  - 15% from restructuring
- 18MTC might count as 'real'
- But…….

How good is your data ?
Is your data credible ?



British Energy

Example of a emission saving project

- completion of Rovno 4/Kmelnitski 2 reactors

- environmental benefit - better than average emissions for Ukraine ESI
- environmental integrity - must pass national planning procedures (and be acceptable to any international funders eg EBRD)
- emission monitoring - output data
- data recording procedures - output data
- accountability for leakage - any offsite emissions caused by project ?
- emission verification programme - by an accredited verification company
- determination of emissions baseline - existing actual emissions prior to a scheme, or the emissions from the least-cost technology available for the activity, or average emissions for such a source in a region or group of countries, or current industry practice in the host country

How good is your data ?

Is your data credible ?

British Energy

Session 8: GHG Baseline Determinations

- **General Objectives:**

  Session 8 is an introduction to the setting of project-level GHG baselines. It seeks to provide participants with an overview of the various methods that have been proposed, as well as the current status of COP actions in this area.

  Topics that should be addressed include:

  - Approaches to baseline determination, including project-specific, hybrid, multi-project and "top down" methods
  - Static vs. dynamic baselines
  - Transaction costs, transparency and environmental effectiveness
  - The role of "additionality"
  - Effects of different baseline approaches
  - Historical experience in JI/AIJ projects

  By the end of the session, participants should have a basic understanding of the following:

  - How GHG baselines can be determined
  - Their role in calculating project carbon credits
  - Experience in their use in previous JI/AIJ projects

- **Activities:** Presentation, followed by period of question and answer

- **Total Time:** 40 minutes

Options for Carbon Baseline Emission Determinations

Bill Daugherty, Tellus Institute

Certifiable Climate Change Transactions
Session 8

Overview of Presentation:

- Baseline approaches
- Effect of approach on "additionality"
- Case studies: Baltic AIJ projects
- Comparison of baseline approaches
- Conclusions

Joint Implementation: What & When

- JI is a *project-based* instrument for reducing GHG emissions
- Investor provides capital, financing, access to technology & technical support, etc.
- This makes possible a project that reduces host entity emissions.
- The emissions reductions are quantified, and credit is transferable to investor.
- Time period for crediting emission reductions: 2008 - 2012

JI activities: Some Examples

Emissions abatement: (new facilities and retrofits)

- energy supply
  - electricity production (renewables, plant efficiency, fuel switching)
  - natural gas extraction and distribution
  - oil extraction and refining
  - coal mining and processing
  - cogeneration of heat and power
  - district heating
- energy demand
  - transport (vehicle efficiency, maintenance, public transport, alternative fuels)
  - industrial energy efficiency
  - buildings (efficient building shells, windows, heating/cooling)
  - appliances (efficient lighting, heavy appliances, electronics)

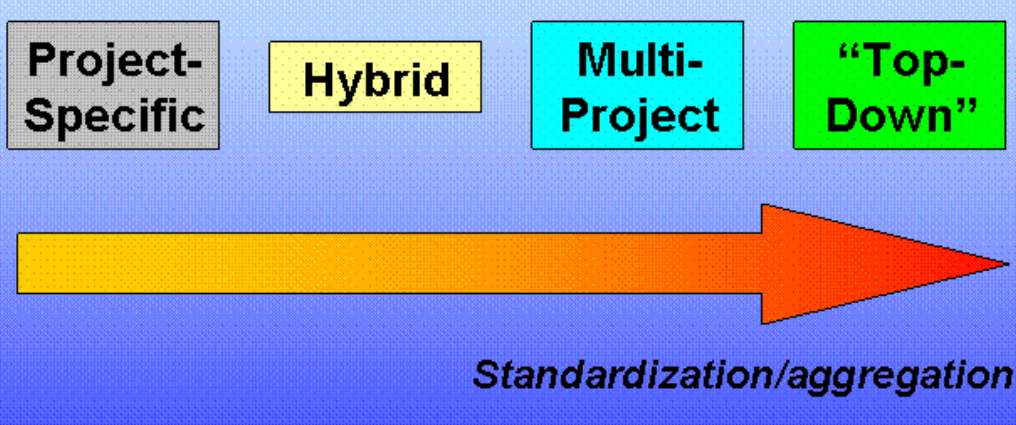
JI : Who are the Players?

- Host(s)
- Investor/Developer
- National JI office
- Operational Entities
- Consultants

Baseline Determination Issues

- Context
- Approaches
- Treatment
- Requirements
- Uncertainty

Baseline Approaches



Tellus Institute Baseline determination 7

Cross-Cutting Themes

- Static versus Dynamic
- Emission Timeline
- Data Sources
- Renewal rate of technology
- Other GHGs
- Pre-combustion emissions

Tellus Institute Baseline determination 8

Emissions Additionality

"… and reductions of emissions that are additional to any that would occur in the absence of the certified project activity." [Kyoto Protocol]

- What would have occurred otherwise?
- What is the counter-factual "baseline" situation ?
- What are the project emissions?
- What no-regrets options are additional?
- Might there be significant leakage ?
- *JI* based on closed transfers

Tellus Institute Baseline determination 9

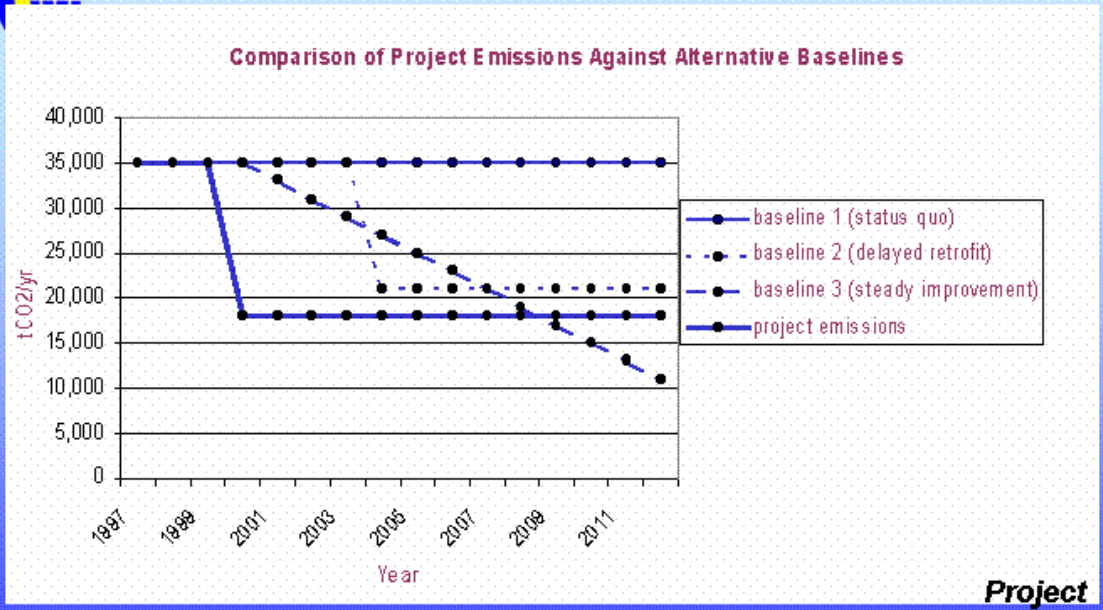
Effect of Different Baselines

Project: Energy efficiency retrofit at a manufacturing plant

- **Baseline 1: Status quo situation**
- **Baseline 2: Future improvement expected**
- **Baseline 3: Sector-wide improvement expected**

Tellus Institute Baseline determination 10

Effect of Different Baselines

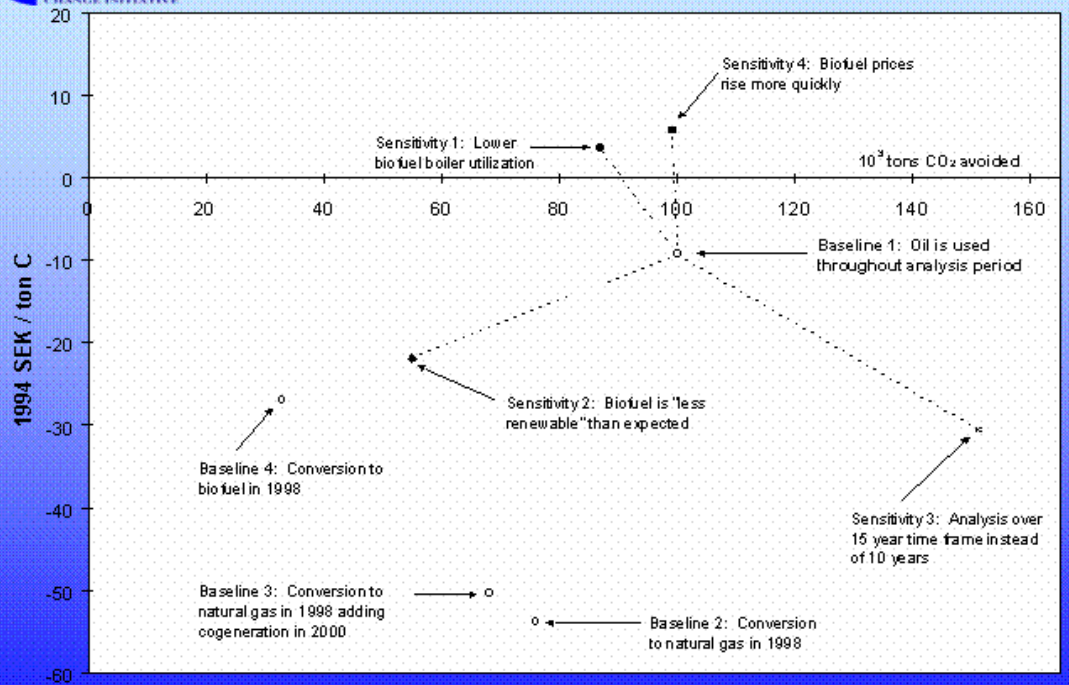


	Baseline 1	Baseline 2	Baseline 3	Project Emissions
cumulative emissions	455,000	329,000	299,000	234,000
total credit	221,000	95,000	65,000	-

Swedish AIJ projects in Baltic

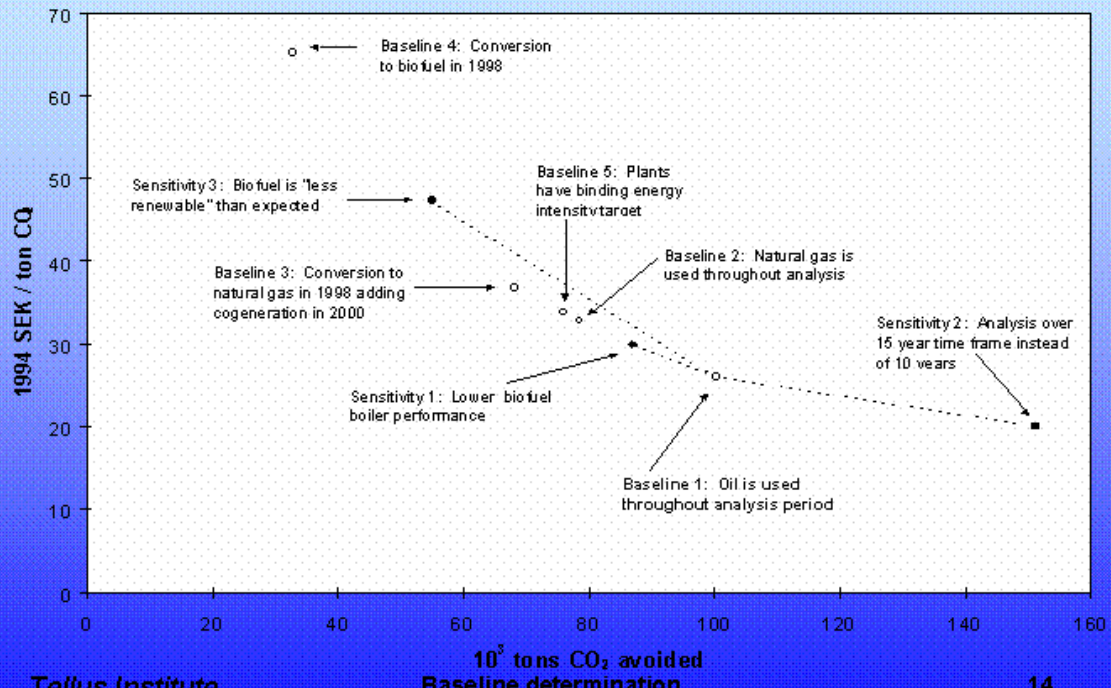
- Boiler conversions
- Small projects in Baltics account for 30-40% of all AIJ projects
- Standard baseline assumption
- Perspectives: Global, investor, host
- Results

Baselines: Global perspective



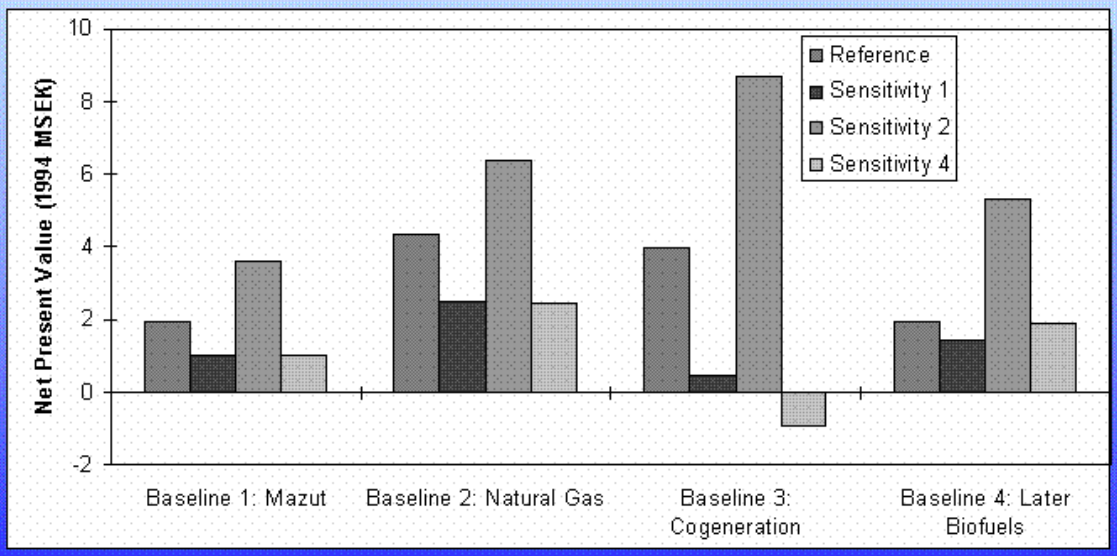
Tellus Institute Baseline determination 13

Baselines: Investor Perspective



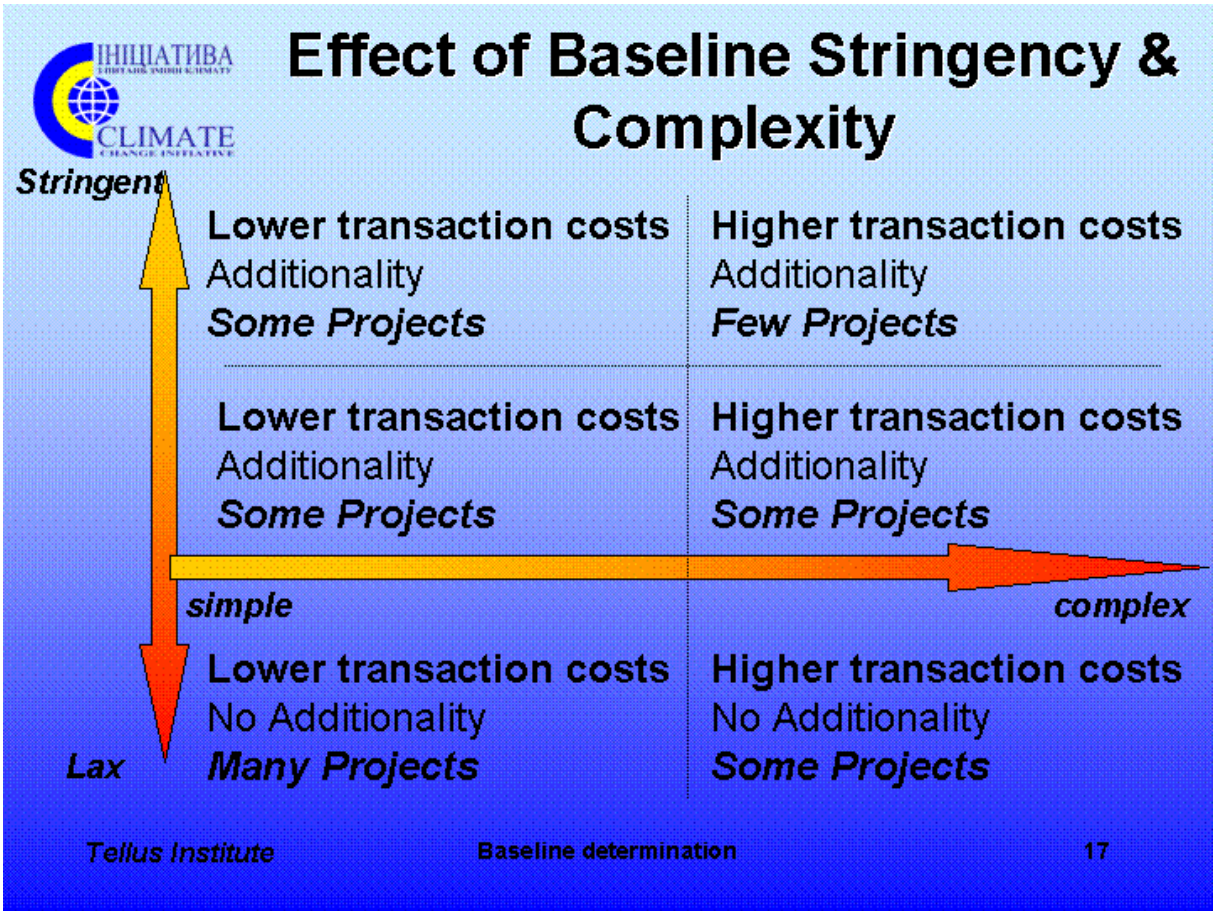
Tellus Institute Baseline determination 14

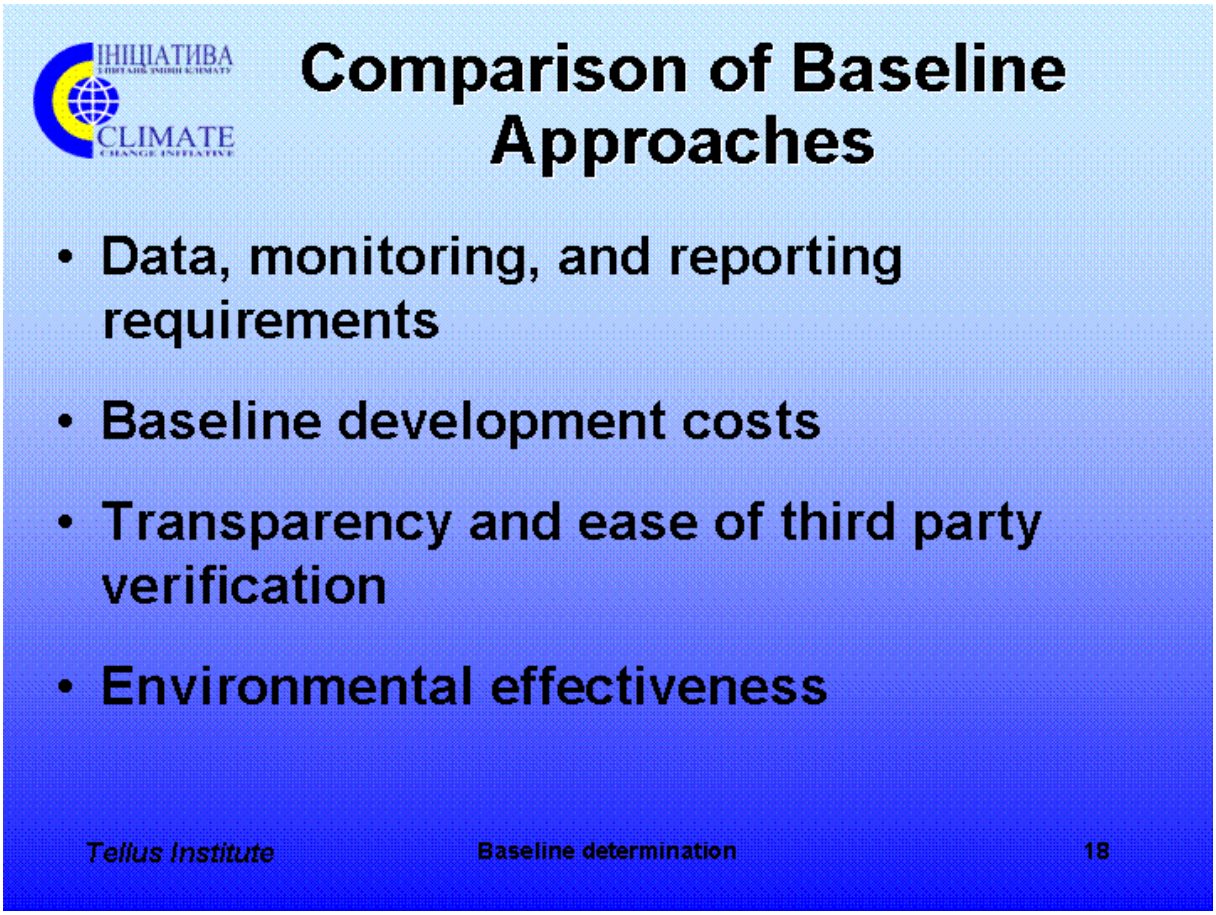
Baselines: Host perspective

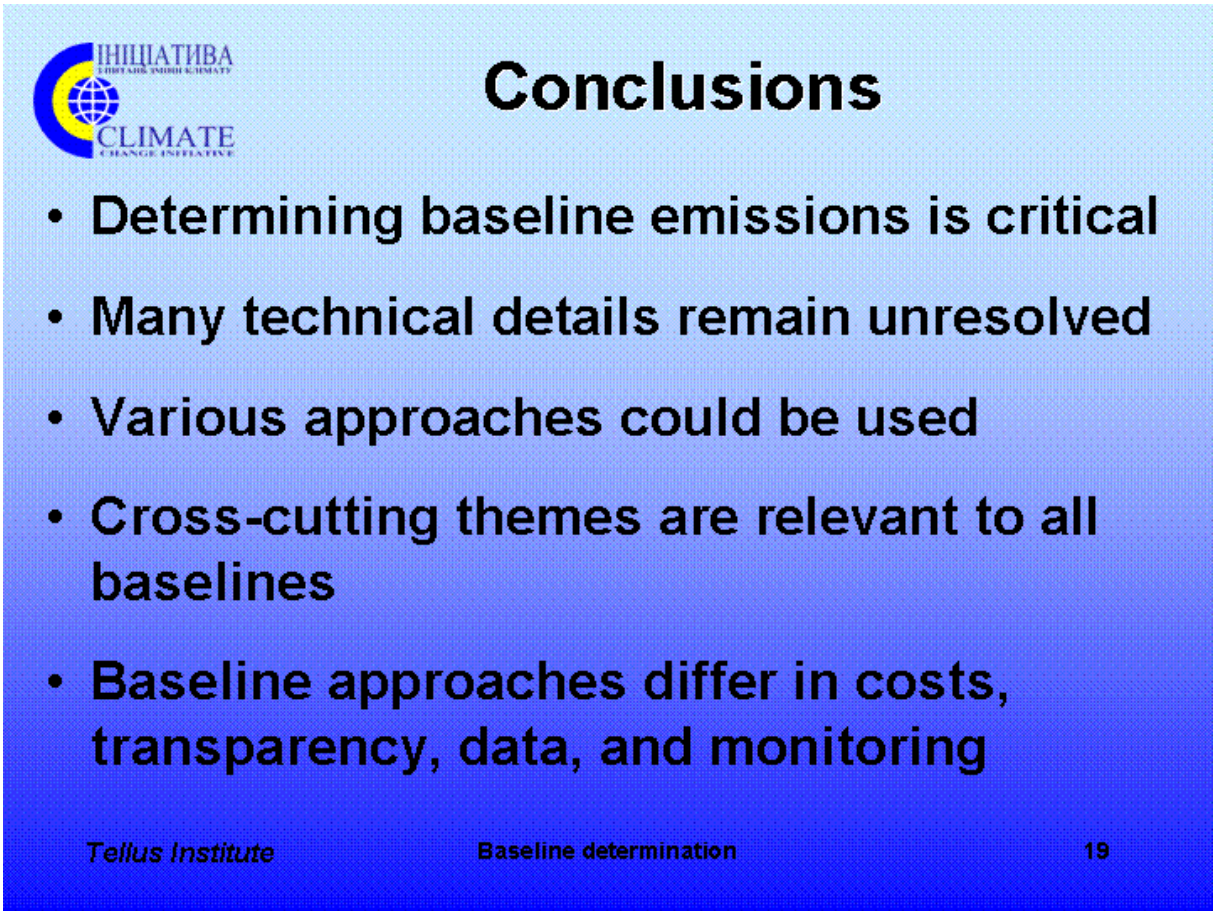


Findings of Assessment

- Baltic AIJ projects are successful models
- Positive and lasting impacts beyond the project boundaries.
- Project baselines were highly inaccurate


Effect of Baseline Stringency & Complexity
Stringent
Lower transaction costs
Additionality
Some Projects
Higher transaction costs
Additionality
Few Projects
Lower transaction costs
Additionality
Some Projects
Higher transaction costs
Additionality
Some Projects
simple
complex
Lax
Lower transaction costs
No Additionality
Many Projects
Higher transaction costs
No Additionality
Some Projects
Tellus Institute
Baseline determination
17


Comparison of Baseline Approaches
• Data, monitoring, and reporting requirements
• Baseline development costs
• Transparency and ease of third party verification
• Environmental effectiveness
Tellus Institute
Baseline determination
18


Conclusions
• Determining baseline emissions is critical
• Many technical details remain unresolved
• Various approaches could be used
• Cross-cutting themes are relevant to all baselines
• Baseline approaches differ in costs, transparency, data, and monitoring
Tellus Institute
Baseline determination
19

Session 9: Monitoring, Evaluation, Reporting and Verification (MERV) Concerns

- **General Objectives:**

  Session 9 is an introduction to the monitoring, evaluation, reporting and verification (MERV) concerns associated with carbon trading approaches. It seeks to provide participants with an understanding of the principal methodological issues in each of these tasks, as well as to update recent COP determinations in these areas.

  Topics that should be addressed include:

  - The role of baselines
  - Measurement uncertainty
  - Frequency and duration of MERV activities
  - Engineering methods
  - Statistical models
  - Metering
  - Performance standards and benchmarks
  - International Performance Measurement and Verification Protocol (IPMVP)
  - Calculating GHG emissions

  By the end of the session, participants should have a basic understanding of the following:

  - The role that MERV plays in carbon trading
  - The principal approaches for conducting MERV
  - The uncertainties and difficulties inherent in these approaches

- **Activities:** Presentation, followed by period of question and answer

- **Total Time:** 40 minutes

Specific Features of Development and Implementation of JI Projects

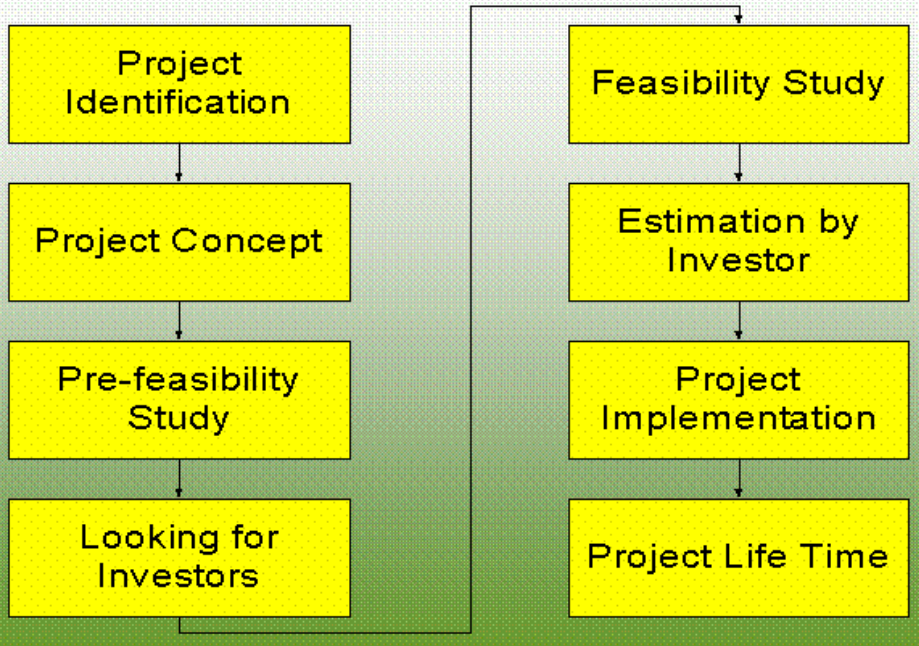
Estimation, Monitoring, Evaluation, Reporting, Verification and Certification

Certifiable Climate Change Transactions

Session 9

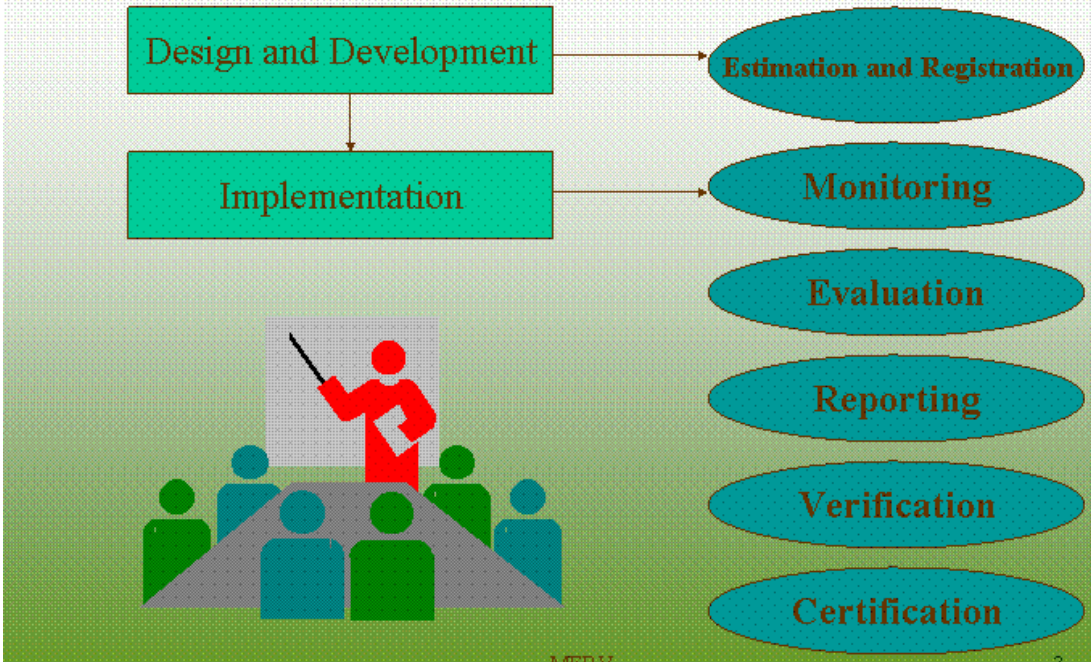
MERV 1

The Main Steps of Investment Project



MERV 2

The Main Steps



MERVC activities should be

- consistent
- technically sound
- readily verifiable
- objective
- simple
- relevant
- transparent
- cost-effective

MERV 4

Main Guidelines and Protocols

- U.S. DOE's International Performance Measurement and Verification Protocol (1997)
- U.S. DOE's Voluntary Reporting of Greenhouse Gases (1994)
- USIJI's Project Proposal Guidelines (1996)
- World Bank's Monitoring and Evaluation Guidelines (1994)
- Guidelines for the Monitoring, Evaluation, Reporting, Verification, and Certification (MERVC) for Climate Change Mitigation (LBNL, 1999)
- UN FCCC Guidelines - COP6 ?????

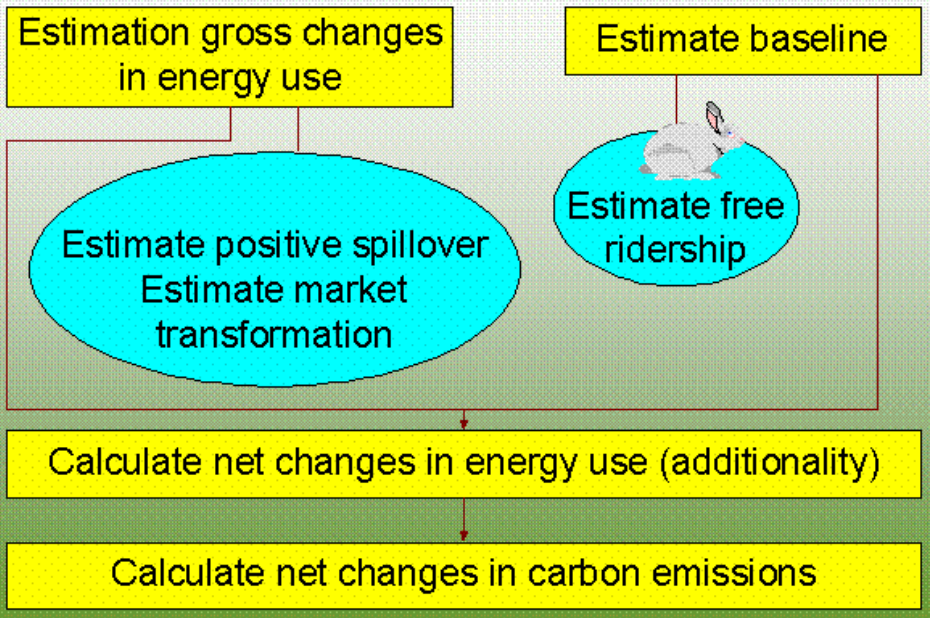
MERV 5

Project Design: Estimation

Estimation refers to making a judgement on the approximate stock of carbon, GHG emissions and costs in the with- and without-project (baseline) scenarios. Estimation can occur throughout the lifetime of the project, but plays a central role during the project design stage when the project proposal is being developed.

MERV 6

Estimation Overview



MERV 7

Project Implementation: Monitoring

Monitoring refers to the measurement of carbon stock, GHG emissions, and costs that occur as a result of the project. Monitoring does not involve the calculation of GHG reductions and does not involve comparisons with previous baseline measurements. Monitoring is often conducted internally, by the project developers.

MERV 8

IPMVP options

Option A: Focuses on physical assessment of equipment changes to ensure the installation is to specification. Key performance factors are determined with spot or short-term measurements and operational factors are stipulated based on analysis of historical data or spot/short-term measurements (Approx. 1-5% of project construction cost).

Option B: Savings are determined after project completion by short-term or continuous measurements taken throughout the term of the contract at the device or system level. Both performance and operations factors are monitored (Typically 3-10% of project construction cost).

MERV 9

IPMVP options(cont.)

Option C: After project completion, savings are determined at the "whole-building" or facility level using current year and historical utility meter (gas or electricity) or sub-meter data (Typically 1-10% of project construction cost).

Option D: Savings are determined through simulation of facility components and/or the whole facility (Typically 3-10% of project construction cost).

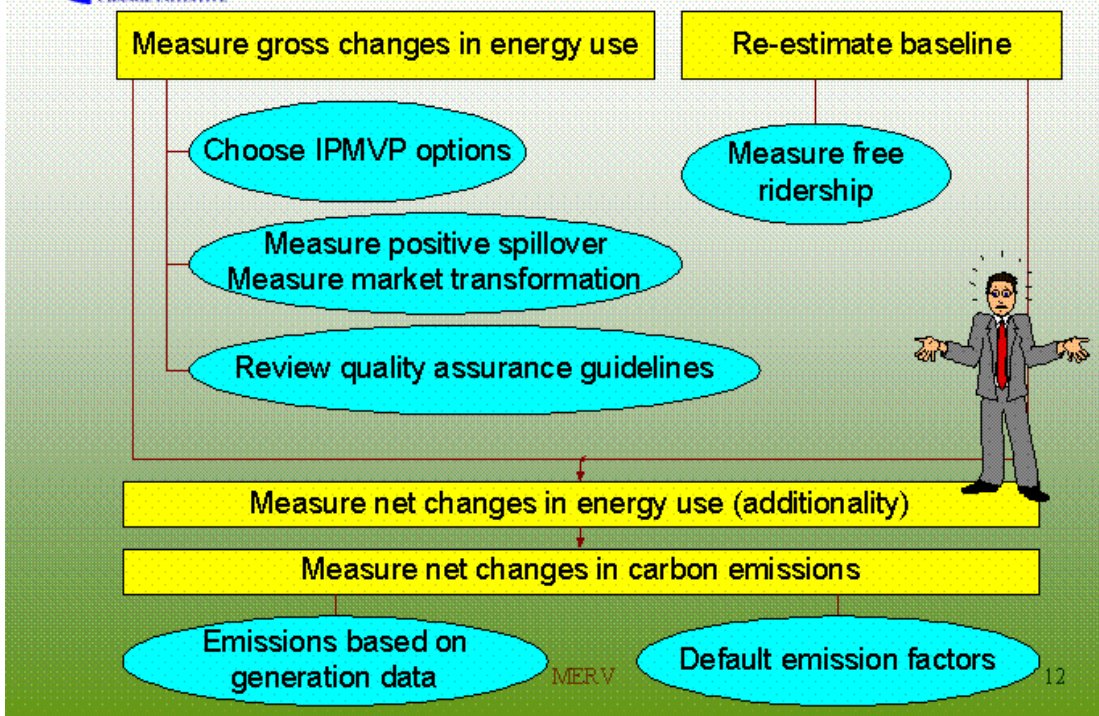
MERV 10

Project Implementation: Evaluation

Evaluation refers to both impact and process evaluations of a particular project, typically entailing a more in-depth and rigorous analysis of a project compared to monitoring emissions. The calculation of GHG reductions is conducted at this stage. Project evaluation would include GHG impacts, and the re-estimation of the baseline, leakage, positive project spillover, etc., which were estimated during the project design stage. Evaluation organizes and analyzes the information collected by the monitoring procedures, compares this information with information collected in other ways, and presents the resulting analysis of the overall performance of a project.

MERV 11

Evaluation Overview



MERV 12

Project Implementation: Reporting

Reporting refers to *measured* GHG impacts of the project (in some cases, organizations may report on their *estimated* impacts, prior to project implementation). Reporting occurs throughout the MERVC process (e.g., periodic reporting of monitored results and a final report once the project has ended).

MERV 13

Uniform Reporting Format

- Projected emissions for baseline and project activity scenario
- Cumulative effects for CO_2, CH_4, N_2O, and other GHG
- Environmental and socioeconomic benefits (quantitative and qualitative)
- Compatibility with national economic development, priorities and strategies
- Practical experience gained or technical difficulties, effects, impacts or other obstacles encountered

MERV 14

Project Implementation: Verification

Verification refers to establishing whether the measured GHG reductions actually occurred, similar to an accounting audit performed by an objective, accredited party not directly involved with the project. Verification can occur without certification.

Certification

Certification refers to certifying whether the measured GHG reductions actually occurred. Certification is expected to be the outcome of a verification process. The value-added function of certification is in the transfer of liability/responsibility to the certifier.

MERV 15

Resume

- Specific features of development and realizing JI projects: Estimation, Monitoring, Evaluation, Reporting, Verification and Certification
- Verification and Certification should be done by the third party
- MERVC activities should be consistent, technically sound, readily verifiable, objective, simple, relevant, transparent, and cost-effective

MERV 16

Resume (cont.)

- Procedures for MERVC are not approved at the international level yet (may be COP6)
- Among existing guidelines the most comprehensive are IPMVP and MERVC guidelines
- These documents focus at the end-use and renewable sources
- Ukraine should elaborate own view

MERV 17

Suggested Handouts & Readings

Handouts:

There are two "primers" included with this module, based upon documents prepared by David South of Energy Resources International, in Washington, DC. One summarizes the state of "post-Kyoto emissions trading." The second addresses the opportunities for private investment in the flexibility mechanism marketplace. Only portions of these documents have been translated and included with this module.

The full documents are available (in English only) from the contacts listed earlier, or from the author. The citations for these documents are as follows:

- South, D., *Emissions Trading: A Post-Kyoto Primer*, Washington, DC: Energy Resources International, Inc., April, 1998; and
- South, D. and Greening, L., *Opportunities for Private Investment in the Market for Flexible Mechanisms Under the Kyoto Protocol*, Washington, DC: Energy Resources International, Inc., May, 2000.

Readings:

The following documents are suggested as background readings for the Ukrainian instructors presenting this module:

Bisson, D., "Let the Trading Begin: Canadian Companies Experiment with Emissions Trading through GERT," *Environmental Manager*, April, 2000.

Bluffstone, R. and Larson, B., *Controlling Pollution in Transition Economies*, Edward Elgar, Cheltenham, UK, 1998.

Costanza, Robert et al., *An Introduction to Ecological Economics*, St. Lucie Press, Boca Raton, FL, 1997.

Cropper, Maureen and Oates, Wallace E., "Environmental Economics: A Survey," *Journal of Economic Literature*, Vol. 30, June, 1992.

Edmonds, J., Scott, M., et al., *International Emissions Trading and Global Climate Change,* Pew Center on Global Climate Change, Washington, DC, December, 1999.

Environmental Defense and the Russian School of Higher Economics, *Building a Market-Based Framework to Spur Capital Investments in Environmental Protection, Infrastructure Modernization, and Technical Innovation and Transfer in the Russian Federation and Newly Independent States*, Prepared for U.S. EPA, 31 May 2000.

Environmental Defense Fund, *Cooperative Mechanisms Under the Kyoto Protocol: The Path Forward*, New York, June, 1998.

EPRI (Electric Power Research Institute), SO_2 Emissions Trading Simulator, AP-100276, Palo Alto, CA, November, 1991.

Esty, Daniel C., “Environmental Protection During the Transition to a Market Economy,” in *Economies in Transition: Comparing Asia and Eastern Europe*, Wing Thye Woo, Stephen Parker and Jeffrey D. Sachs, Eds., MIT Press, Cambridge, MA, 1997.

Evans, M., *Joint Implementation in Countries in Transition: An Analysis of the Potential and the Barriers*, Prepared for U.S. EPA, Pacific Northwest Labs, March, 1995.

Kyoto Protocol to the United Nations Framework Convention on Climate Change, FCCC/CP/1997/L.7/Add. 1, December 10, 1997.

Meidinger, Errol, "The Development of Emissions Trading in U.S. Air Pollution Regulation," in Keith Hawkins and John M. Thomas, Eds., *Making Regulatory Policy*, University of Pittsburgh Press, 1989.

National Academy of Public Administration, *The Environment Goes To Market: The Implementation of Economic Incentives for Pollution Control*, Washington, D.C., July, 1994.

OECD, *Climate Change: Designing a Tradable Permit System*, Paris, 1992.

OECD, “International Greenhouse Gas Emissions Trading,” Working Paper No. 9, Annex I Group on the UNFCCC, , Paris, 1997.

OECD, “Lessons from Existing Trading Systems for International Greenhouse Gas Emissions Trading,” Information Paper, Annex I Expert Group on UNFCCC, Paris, August, 1998.

Petsonk, Annie, Daniel J. Dudek and Joseph Goffman, *Market Mechanisms & Global Climate Change: An Analysis of Policy Instruments*, Pew Center on Global Climate Change, Washington, DC., 1998.

Raufer, Roger K., *Pollution Markets in a Green Country Town: Urban Environmental Management in Transition*, Praeger Publishers, Westport, CT, 1998.

Ridley, M., *Lowering the Cost of Emission Reduction: Joint Implementation in the Framework Convention on Climate Change*, Kluwer Academic Publishers, London, 1998.

Tietenberg, Thomas H., *Emissions Trading: An Exercise in Reforming Pollution Policy*, Resources for the Future, Washington, D.C., 1985.

Tietenberg, Thomas H., "Transferable Discharge Permits and Global Warming," in *The Handbook of Environmental Economics*, Daniel W. Bromley (Ed.), Blackwell Publishers, Cambridge, MA, 1995.

Victor, D., Nakicenovic, N., and Victor, N., *The Kyoto Protocol Carbon Bubble: Implications for Russia, Ukraine, and Emission Trading*, IIASA Interim Report, Laxenburg, Austria, October, 1998.

Weyant, J., *An Introduction to the Economics of Climate Change Policy*, Pew Center on Global Climate Change, Washington, DC, July, 2000

Conference Evaluation Form

Title of Conference: Certifiable climate change transactions
Date: _____

For each statement below, mark the circle on the scale that corresponds to your opinion.

		Evaluation Score					
		1	**2**	**3**	**4**	**5**	
1. The presentation of the conference was	Unclear	O	O	O	O	O	Clear
2. The objectives of the conference were	Not important	O	O	O	O	O	Important
3. The information presented at the conference was	Not sufficient	O	O	O	O	O	Sufficient
4. The information presented at the conference was	Not useful	O	O	O	O	O	Useful
5. The knowledge acquired through this conference was	Insignificant	O	O	O	O	O	Important
6. Participating in this conference enabled you to learn	Nothing new	O	O	O	O	O	Many new things

What did you like most about this conference?

_____

_____

_____

What did you like least about this conference?

_____

_____

_____

What is your opinion on presenters?

What is your opinion on organization of the conference?

On what themes presented in the conference would you like to get more information?

What conference themes would be interesting for you in the future?

Comments:

Thank you for filling in the evaluation form.